DRAFT
ENVIRONMENTAL ASSESSMENT

LAKE TEXOMA
STORAGE REALLOCATION STUDY,
LAKE TEXOMA, OKLAHOMA AND TEXAS

US Army Corps
Of Engineers
Tulsa District

JANUARY 2005

ENVIRONMENTAL ASSESSMENT ORGANIZATION

This Environmental Assessment (EA) evaluates the environmental effects of the U.S. Army Corps of Engineers, Tulsa District's Proposed Action to reallocate water supply storage at Lake Texoma, Oklahoma. This EA will facilitate the decision process regarding the Proposed Action and alternatives.

SECTION 1 — *PURPOSE, NEED, AND SCOPE* summarizes the purpose of and need for the Proposed Action, provides relevant background information, and describes the scope of the EA.

SECTION 2 — *ALTERNATIVES* examines the alternatives to implementing the Proposed Action.

SECTION 3 — *PROPOSED ACTION* describes the recommended action.

SECTION 4 — *AFFECTED ENVIRONMENT* describes the existing environmental and socioeconomic setting.

SECTION 5 — *ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION* identifies the potential environmental and socioeconomic effects of implementing the proposed action and alternatives.

SECTION 6 — *MITIGATION PLAN* summarizes mitigation actions required to enable a Finding of No Significant Impact for the Proposed Action.

SECTION 7 — *FEDERAL, STATE, AND LOCAL AGENCY COORDINATION* provides a listing of individuals and agencies consulted during preparation of the EA.

SECTION 8 — *REFERENCES* provides bibliographical information for cited sources.

SECTION 9 — *APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS* provides a listing of environmental protection statutes and other environmental requests.

SECTION 10 — *LIST OF PREPARERS* identifies persons who prepared the document and their areas of expertise.

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- *A* Coordination/Correspondence
- *B* SUPER Model Outputs
- *C* U.S. Fish and Wildlife Service Correspondence
- *D* Cultural Resources Coordination
- *E* Section 404 Permit Correspondence
- *F* Public Notice, Comments, and Agency Responses

DRAFT FINDING OF NO SIGNIFICANT IMPACT

In accordance with the National Environmental Policy Act of 1969, including guidelines in 33 Code of Federal Regulations, Part 230, the Tulsa District has assessed the environmental impacts of reallocating 300,000 acre-feet of hydropower storage to water supply storage at Lake Texoma, Oklahoma and Texas. The Water Resources Development Act of 1986 (Public Law 99-662), authorized the Secretary of the Army to reallocate this water for municipal, industrial, and agricultural water users in both Oklahoma and Texas (a reallocation of 150,000 acre-feet for use by each state). This assessment was prepared in accordance with U.S. Army Corps of Engineers Regulations, Part 230, Policy and Procedures for Implementing the National Environmental Policy Act. It has been determined from the enclosed Environmental Assessment that the water reallocation will have no significant adverse effects on the natural or human environment. Therefore, an environmental impact statement will not be prepared.

_____ _____

Date

Miroslav P. Kurka
Colonel, U.S. Army
District Engineer

Enclosure
Environmental Assessment

DRAFT ENVIRONMENTAL ASSESSMENT OF LAKE TEXOMA STORAGE REALLOCATION STUDY, LAKE TEXOMA, OKLAHOMA AND TEXAS

Prepared for:

U.S. Army Corps of Engineers
Southwestern Division
Tulsa District

Prepared by:

engineering-environmental Management, Inc. (e^2M)
1510 West Canal Court, Suite 2000
Littleton, CO 80120

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ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
BA	Biological Assessment
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
EA	Environmental Assessment
MSL	Mean Sea Level
NEPA	The National Environmental Policy Act
ODWC	Oklahoma Department of Wildlife Conservation
OKDEQ	Oklahoma Department of Environmental Quality
Service	United States Fish and Wildlife Service
SIP	State Implementation Plan
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency

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1 Purpose, Need, and Scope

The U.S. Army Corps of Engineers, Tulsa District is proposing to reallocate storage in Lake Texoma, Oklahoma and Texas, from hydropower storage to water supply storage, pursuant to the Water Resources Development Act of 1986 passed by Congress (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 150,000 acre-feet each for Oklahoma and Texas for municipal, industrial, and agricultural water uses (a total reallocation of 300,000 acre-feet).

This project is needed to meet the expanding municipal and industrial water supply demands that are a result of population growth in the region. Denison Dam and Lake Texoma were authorized for construction by the Flood Control Act approved June 28, 1938, (Public Law 75-791) for flood control and generation of hydroelectric power (USACE 2003a). The dam, spillway, and outlet works were started in August 1939 and completed in February 1944. At that time, Denison Dam was America's largest rolled, earthfilled dam. The project was put into operation for flood control in January 1944. The first hydroelectric turbine was placed in operation in March 1945, while a second unit became operational in September 1949. Denison Dam is on the Red River in Bryan County, Oklahoma, and Grayson County, Texas, about 726 miles upstream from the mouth of the river. The damsite is approximately 5 miles northwest of Denison, Texas, and 15 miles southwest of Durant, Oklahoma (Figure 1). Lake Texoma is in Bryan, Marshall, Johnston, and Love counties, Oklahoma; and in Grayson and Cooke counties, Texas (USACE 2003a).

Lake Texoma is now the 12th largest lake in volume in the United States, with a current flood storage capacity of 2,544,830 acre-feet, and hydropower storage capacity of 1,467,283 acre-feet, which includes 150,000 acre-feet for water supply. The main embankment is 15,200 feet long with a maximum height of 165 feet above the streambed (Figure 2). The outlet works consist of three 20-foot diameter concrete conduits through the embankment and six 9-by-19-foot vertical lift gates (Figure 3). The power-intake structure will permit future installation of three additional power units (USACE 2003a, 2003b). Lake Texoma currently provides numerous services to communities in Oklahoma and Texas, including flood control, water supply, hydroelectric power, regulation of Red River flows, improvements to navigation, and recreation resources (USACE 1996a).

The National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190) requires all Federal agencies to address the environmental impacts of any major Federal action on the natural and human environment. Guidance for complying with NEPA is contained in Title 40 of the Code of Federal Regulations (CFR), Parts 1500 through 1508, and in Engineering Regulation 200-2-2, *Procedures for Implementing NEPA*. The primary intent of NEPA is to ensure that as a part of the decision making process, Federal agencies consider the potential environmental consequences of their proposal, document the analysis, and make the information available to the public for comment prior to implementation. This Environmental Assessment (EA) was developed to assure that the proposed storage reallocation project complies with the intent of NEPA.

The Tulsa District issued a news release on August 6, 2003, announcing public information workshops for the Lake Texoma storage reallocation project. Paid display advertisements were published on September 2, 14, and 16, 2003, in the *Denison Herald Democrat*, and September 3, 14, and 17, 2003, in the *Durant Democrat*. The Tulsa District sent scoping and workshop announcements to state and Federal resource agencies. The advertisement and the announcements (Appendix A) initiated the NEPA scoping process.

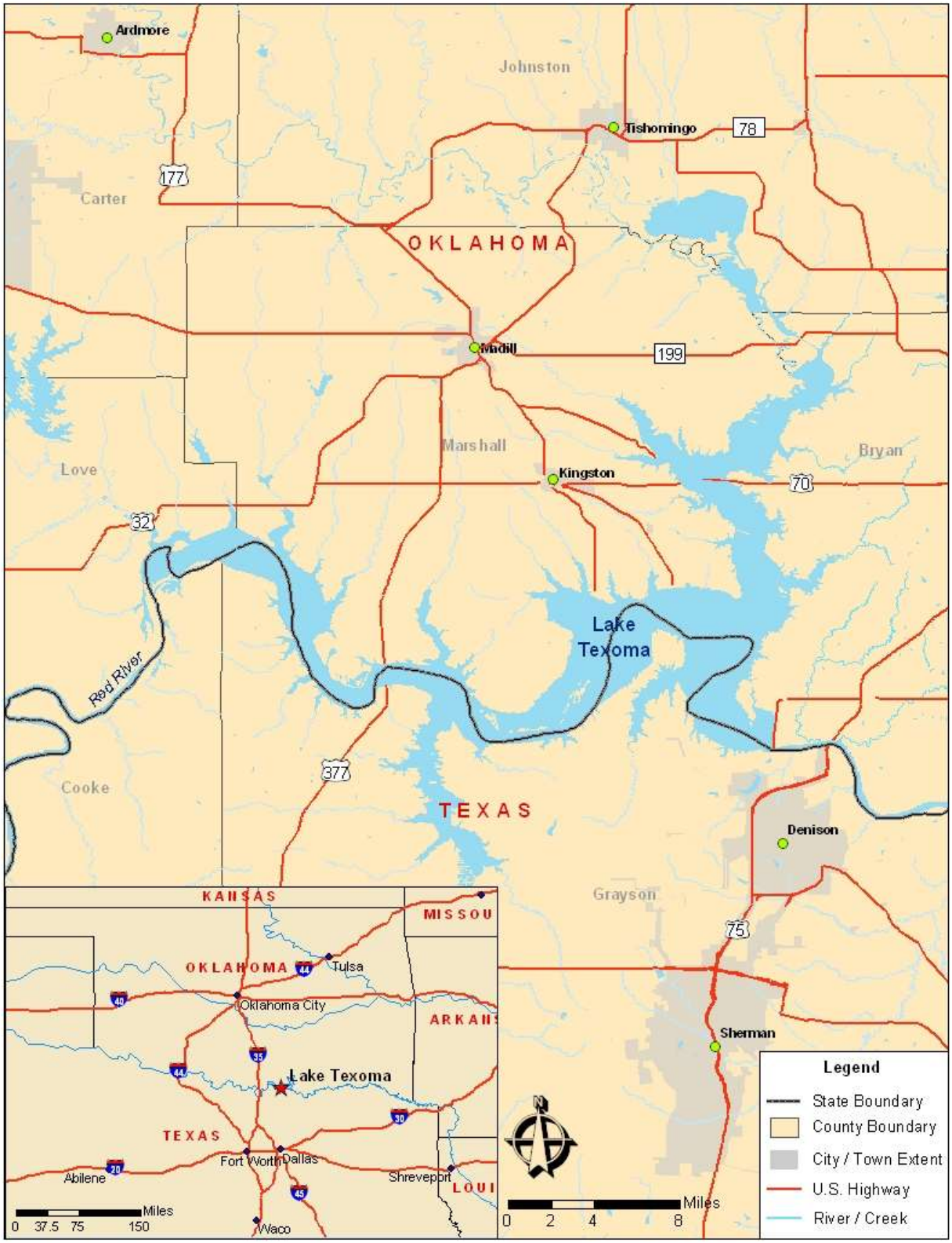

Figure 1. Vicinity Map, Lake Texoma Storage Reallocation Project

Figure 2. Denison Dam and Power Intake Structure

Figure 3. Hydropower Facility and Outlet Works at Denison Dam

The Tulsa District held workshops on September 16, 2003, (5:00 p.m.–8:00 p.m.) at the Denison Public Library and on September 17, 2003, (5:00 p.m.–8:00 p.m.) at the Durant Chamber of Commerce. Twenty persons attended the workshop including representatives from local, state, and Federal agencies; Native American tribes; congressional delegates; and private citizens. One attendee expressed concern about the striped bass (*Morone saxatilis*) fishery in the lake. Representatives from the Tulsa District explained that the purpose of establishing the seasonal pool in Lake Texoma was to help this fishery. Several attendees expressed concern about the potential for additional pool drawdown and shallow water depths near some of the marinas, docks, and boat ramps. One attendee in favor of reallocation expressed an interest in possibly acquiring future water rights on behalf of his entity, and one attendee opposed to reallocation expressed concern about lower lake levels rendering docks unusable.

2 Alternatives

2.1 No Action Alternative

The Council on Environmental Quality (CEQ) regulations implementing the provisions of NEPA require Federal agencies to consider a No Action Alternative. These regulations define the No Action Alternative as the continuation of existing conditions and their effects on the environment, without implementation of, or in lieu of, a proposed action. The No Action Alternative represents the existing condition, would not result in any project-related environmental impacts, and serves as the baseline against which to compare the effects of the other alternatives.

Under the No Action Alternative, the storage allocation for all major purposes would be maintained at the current level. The reallocation of 300,000 acre-feet of additional storage from hydropower to water supply would not occur, and the existing allocation of 150,000 acre-feet for water supply would remain. Essentially all of the current water supply storage is being used and North Texas currently is in need of additional water. With the No Action Alternative, this need would not be met. In accordance with Section 4.04 of Article IV of the Red River Compact, division of the flows from the main stem of the Red River into Lake Texoma between the states of Oklahoma and Texas will continue to be in effect.

2.2 Action Alternatives

For this EA, only one alternative has been identified. This alternative is the Proposed Action. Under the Proposed Action, this provision of the Water Resources Development Act of 1986 would be fulfilled by reallocating 300,000 acre-feet of storage currently in the hydropower pool to water supply at Lake Texoma.

3 Proposed Action

Under the Proposed Action, pool elevations at Lake Texoma would not be changed. In accordance with the Water Resources Development Act of 1986, 300,000 acre-feet of water currently in hydropower storage would be reallocated to water supply storage, creating a total of 450,000 acre-feet of water supply. The hydropower storage proposed for reallocation has not been used for hydropower generation in the past. The reallocation would provide up to 150,000 additional acre-feet for municipal, industrial, and agricultural water users in the state of Oklahoma and up to 150,000 additional acre-feet for municipal, industrial, and agricultural water users in the state of Texas. This apportionment of the reallocation is consistent with Section 4.04 of Article IV of the Red River

Compact, which states that water storage in Lake Texoma, as well as flow from the main stem of the Red River into Lake Texoma, will be divided equally between the states of Oklahoma and Texas.

Water supply at Lake Texoma was not an original project purpose. Several special congressional authorizations have made storage available to users throughout the years. When the Federal government realized that there was an increasing demand for water supply storage, studies were conducted (in 1983 and 1985) to reallocate a total of 150,000 acre-feet of storage from the hydropower purpose to water supply. The cost charged to the user for the storage is based on the highest of either benefits or revenues foregone, replacement costs (as a result of reallocating hydropower storage), or updated cost of storage. The cost of the storage that has been identified as being available for reallocation, but not currently under contract, will continue to increase in value annually until a water storage contract is signed. Storage is not considered to be reallocated from its original purpose until a water storage contract is entered into, and the user starts to pay for and use the storage.

4 Affected Environment

4.1 Location

The Lake Texoma project study area consists of the main body of the lake as well as the various arms created by the Denison Dam. The lake is on the Red River between Texas and Oklahoma, approximately 5 miles north of Denison, Texas (see Figure 1). As mentioned previously, the lake spans numerous counties in both states, including Bryan, Marshall, Johnston, and Love counties, Oklahoma; and Grayson and Cooke counties, Texas. Lake Texoma receives water from the drainage area of the Washita and Red Rivers (approximately 39,719 square miles) (USACE 2003a).

4.2 Climate

Data in the region indicate that the climate in the project area is typified by long, hot summers and relatively short, mild winters. The average summer (June, July, and August) temperature for the Oklahoma counties of Bryan, Marshall, Johnston, and Love is 80.6 degrees Fahrenheit (°F). The average winter (December, January, and February) temperature is 42 °F. Average annual precipitation in these counties is about 43 inches, with an average of 27 inches usually falling during the period of April through October. As a result of squall-line thunderstorms, rains occur most frequently in the late spring with peak rainfall amounts in May. Average seasonal snowfall is 0 to 6 inches (OCS 2002).

Average summer temperatures in the vicinity of Cooke and Grayson Counties, Texas is 80 °F, while the average winter temperature is 46.6 °F. Average annual precipitation in the vicinity of these counties is about 35.2 inches, with an average of 23 inches falling during the period of April through October. Peak rainfall amounts occur in May, and the average seasonal snowfall is 0.55 inches (NCDC 2002).

The prevailing winds in the vicinity of Lake Texoma (as recorded in Sherman, Texas, approximately 15 miles south of Denison Dam) are from the south-southeast (NCDC 1998).

4.3 Socioeconomics

4.3.1 Study Area

Lake Texoma is within several Oklahoma and Texas counties. The primary communities in the vicinity of Lake Texoma are Denison, Texas, (approximately 5 miles south) and Durant, Oklahoma (approximately 15 miles north). The city of Durant and counties of Bryan, Marshall, Johnston, and Love, Oklahoma; and the city of Denison and the counties of Grayson and Cooke, Texas, are considered the social area where project-related impacts could occur.

4.3.2 Population

Tables 1 and 2 summarize population data from the 2000 Census for the communities and counties in the social area that could be affected by the proposed storage reallocation project at Lake Texoma.

Table 1. Area Population: City of Durant; Bryan, Marshall, Johnston, and Love Counties; and the State of Oklahoma

	Census 1990 Population	Census 2000 Population	Percent Growth
City of Durant	12,823	13,549	5.6%
Bryan County	32,089	36,534	13.9%
Marshall County	10,829	13,184	21.7%
Johnston County	10,032	10,513	4.8%
Love County	8,157	8,831	13.4%
State of Oklahoma	3,145,585	3,450,654	9.7%

Sources: U.S. Census Bureau 2003, 2004

Table 2. Area Population: City of Denison; Grayson, and Cooke Counties; and the State of Texas

	Census 1990 Population	Census 2000 Population	Percent Growth
City of Denison	21,505	22,773	5.9%
Grayson County	95,021	110,595	16.4%
Cooke County	30,777	36,363	18.1%
State of Texas	16,986,510	20,851,820	22.8%

Sources: U.S. Census Bureau 2003, 2004

4.3.3 Employment and Income

In 2000, there were 252,342 people in the social area for the Lake Texoma storage reallocation project. The majority of the workers in the social area are employed in the educational, health, and social services; manufacturing; and retail trade sectors. As petroleum is found extensively in the vicinity of Lake Texoma, oil and gas pumping plants, refineries, foundries, and associated industries for the processing of petroleum products are of major importance in northern Texas and portions of

southern Oklahoma (USACE 1993a). Tables 3 and 4 present employment and income information for the social area.

4.3.4 Social Ecology

The social area contains a mix of residential areas; agriculture and livestock raising; retail, commercial, and concession operations, many of which provide recreation-related services (e.g.,

Table 3. Employment and Income: City of Durant; Bryan, Marshall, Johnston, and Love Counties; and the State of Oklahoma

	Census 2000 Per Capita Income[1]	Census 2000 Median Household Income[1]	July 2004 Unemployment Rate
City of Durant	$13,849	$25,328	3.2%[2]
Bryan County	$14,217	$27,888	3.2%[3]
Marshall County	$14,982	$26,437	4.6%[3]
Johnston County	$13,747	$24,592	5.0%[3]
Love County	$16,648	$32,558	5.2%[3]
State of Oklahoma	$17,646	$33,400	4.4%[3]

Sources: [1]U.S. Census Bureau 2004, [2]OKDOC 2004, [3]ORIGINS 2004

Table 4. Employment and Income: City of Denison; Cooke and Grayson Counties; and the State of Texas

	Census 2000 Per Capita Income[1]	Census 2000 Median Household Income[1]	August 2004 Unemployment Rate[2]
City of Denison	$17,685	$31,474	6.3%
Grayson County	$18,862	$37,178	5.6%
Cooke County	$17,889	$37,649	4.2%
State of Texas	$19,617	$39,927	5.8%

Sources: [1]U.S. Census Bureau 2004, [2]TWC 2004

marinas, gas stations, lodging, restaurants, boat rentals, picnic areas) to lake users; and industrial activities. The growing communities of Durant, Oklahoma, and Denison, Texas, serve as centers for retail and service businesses, while Lake Texoma is a major recreation destination, especially for the residents of North Texas.

4.4 Natural Resources

4.4.1 Terrestrial

The topography surrounding Lake Texoma varies from gently sloping flats to rocky and precipitous cliffs to steep, wooded hillsides (Figure 4). The terrain in the vicinity of the lake varies in elevation from about 850 feet above mean sea level (MSL) in Marshall County, Oklahoma, to approximately 500 feet above MSL at the base of the dam (USACE 1989, 2003a). The formation of the lake has influenced vegetation and habitat, creating shoreline environments that did not exist prior to filling the reservoir, and eliminating floodplain and riparian habitat that was supported along the Red River in this area.

Figure 4. Shoreline Topography and Vegetation of Lake Texoma

The project area is located in the Prairie Parkland (Subtropical) Province of the Prairie Division (Bailey 1995). Lake Texoma is in a transitional zone between the Eastern Oak Forest and the Tallgrass Prairie. There are four basic vegetative types identified around the lake: marsh, bottomland forest, post oak-blackjack oak (*Quercus stellata-Q. marilandica*) forest, and tallgrass prairie (USACE 2003a). Marshes are areas generally inundated with water long enough to support emergent wetland vegetation. At Hagerman National Wildlife Refuge on the south side of Lake Texoma, marshes support vegetation such as wild millet (*Pennisetum americanum*), sedges (*Carex* spp.), and smartweed (*Polygonum* spp.) (USFWS 2004).

Radiating out from the shoreline to higher, better-drained sites, the vegetation community progresses from subclimax to climax bottomland forests. The mesic shoreline environment is dominated by vegetation including black and sandbar willow (*Salix nigra* and *S. exigua*), buttonbush (*Cephalanthus occidentalis*), and the exotic tamarisk (*Tamarix* spp.). The subclimax bottomland forest extending outward from the edge of the lake supports cottonwoods (*Populus* spp.), sycamore (*Platanus occidentalis*), and willows (USACE 1989).

The climax bottomlands around Lake Texoma are composed of a variety of large mature trees, including pecan (*Carya illinoensis*), black walnut (*Juglans nigra*), hackberry (*Celtis* spp.), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), red oak (*Q. rubra*), and black oak (*Q. velutina*). None of these species are dominant in the overstory, and are distributed variably throughout this climax bottomland forest community (USACE 1989).

The post oak-blackjack oak forests are found in upland areas around the lake. Other tree species found in this plant community include shumard oak (*Q. shumardii*), chinquapin oak (*Q.*

muehlenbergii), black hickory (*Carya texana*), American elm, and eastern red cedar (*Juniperus virginiana*) (USACE 1989, 1996b).

Beyond these oak forests surrounding Lake Texoma is a tallgrass prairie plant community. The grasslands within the boundaries of the Lake Texoma project are managed by the Tulsa District primarily for grazing. King Ranch bluestem (*Bothriochloa ischaemum*) and Bermuda grass (*Cynodon dactylon*) have been planted in some of these areas to improve pasture conditions. The predominant native grasses supported in the tallgrass prairie community include big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). In many places, this prairie community is being invaded by grasses and forbs characteristic of overgrazed or disturbed sites (USACE 1989).

4.4.2 Soils and Prime Farmland

Soils of the Lake Texoma storage reallocation project area are generally nearly level to sloping, loamy and clayey soils. Approximately 25 soil associations have been identified in the vicinity of Lake Texoma. These associations are listed and briefly described in Table 5.

Soil that is prime or unique farmland as defined in the Farmland Protection Policy Act (7 United States Code [U.S.C.] 4201–4209) is classified as prime farmland. According to the U.S. Department of Agriculture, prime farmland soil is soil that is best suited for producing food, feed, forage, fiber, and oilseed crops. Those soils that could occur in the associations noted above and that have been classified as prime farmland are listed in Table 6.

Table 5. Soil Associations in the Vicinity of Lake Texoma

Soil Association	Description
OKLAHOMA[1]	
BRYAN COUNTY	
Muskogee-Boxville	Deep, nearly level to sloping, moderately well-drained or well-drained, loamy soils that have a loamy or clayey subsoil. Found on uplands. Makes up about 16 percent of soils in Bryan County.
Bernow-Romia	Deep, strongly sloping to moderately steep, well-drained, sandy or loamy soils that have a loamy subsoil. Found on uplands. Makes up about 11 percent of soils in Bryan County
JOHNSTON COUNTY	
Verdigris-Gracemont-Oklared	Deep, nearly level or very gently sloping, well-drained to somewhat poorly drained, loamy or sandy soils that have a loamy subsoil. Found on floodplains. Makes up about 8 percent of soils in Johnston County
Konawa-Dougherty	Deep, nearly level or very gently sloping, well-drained, loamy or sandy soils that have a loamy subsoil. Found on uplands. Makes up about 4 percent of soils in Johnston County.
Gasil-Stephenville	Deep or moderately deep, very gently sloping to strongly sloping, well-drained loam soils that have a loamy subsoil. Found on uplands. Makes up about 21 percent of soils in Johnston County.

Table 5. Soil Associations in the Vicinity of Lake Texoma (cont'd)

Soil Association	Description
Burleson-Durant-Ferris	Deep, nearly level to strongly sloping, moderately well-drained or well-drained, clayey or loamy soils that have a clayey subsoil. Found on uplands. Makes up about 18 percent of the soils in Johnston County.
LOVE COUNTY	
Dougherty-Eufaula	Deep, nearly level to gently rolling, well-drained, sandy soils that have a loamy subsoil. Found on uplands. Makes up about 23 percent of soils in Love County.
Teller-Minco	Deep, nearly level to moderately sloping, well-drained, loamy soils that have a loamy subsoil. Found on uplands. Makes up approximately 9 percent of the soils in Love County.
Windthorst-Stephenville	Deep, nearly level and gently rolling, well-drained loamy soils that have clayey or loamy subsoils. Found on uplands. Makes up approximately 34 percent of soils in Love County.
Miller-Yahola	Deep, nearly level, moderately well-drained to well-drained, clayey and loamy soils that have clayey and loamy subsoils. Found on bottomlands along the Red River. Makes up about 3 percent of soils in Love County.
San Saba-Durant	Deep, gently sloping to rolling, moderately well-drained, clayey soils that have clayey subsoils. Found on uplands. Makes up about 18 percent of soils in Love County
MARSHALL COUNTY	
Bastrop-Konawa	Deep, nearly level to sloping, well-drained soils with a loamy surface layer and loamy subsoil. Found on terraces along the Red River, Washita River, and some major streams. Makes up about 10 percent of the soils in Marshall County.
Dougherty-Konawa	Deep, nearly level to sloping, well-drained soils with a sandy and loamy surface layer and loamy subsoils. Found on terraces along the Red River and some major streams. Makes up about 8 percent of soils in Marshall County.
Ferris-Tarrant-Heiden	Deep and shallow, very gently sloping to moderately steep, well-drained soils that are clayey or cobbly and clayey throughout. Found on uplands. Makes up about 42 percent of soils in Marshall County.
Durant-Collinsville	Deep and shallow, very gently sloping to strongly sloping, moderately well-drained and somewhat excessively drained soils with a loamy surface layer and loamy and clayey subsoils. Found on uplands. Makes up about 17 percent of soils in Marshall County.
Frioton-Gracemont	Deep, nearly level, well-drained and somewhat poorly drained soils with a loamy surface layer over loamy sediments. Found on floodplains. Makes up about 3 percent of soils in Marshall County.

Table 5. Soil Associations in the Vicinity of Lake Texoma (cont'd)

Soil Association	Description
Konsil-Madill	Deep, nearly level to moderately steep, well-drained soils with a loamy surface layer and a loamy subsoil (on uplands), and a loamy surface layer over loamy sediments (on floodplains). Found on uplands and floodplains. Makes up about 18 percent of soils in Marshall County.
TEXAS[2]	
COOKE COUNTY	
Sanger-Slidell-San Saba	Deep and moderately deep, nearly level to sloping, well-drained, clayey soils that have clayey subsoils. Found on uplands. Makes up about 20 percent of soils in Cooke County.
Gaddy-Teller-Miller	Deep, nearly level, well-drained to somewhat excessively drained, loamy sands, and clayey soils that have sandy loam and clayey subsoils. Found on bottomlands and terraces. Makes up about 4 percent of soils in Cooke County.
Sanger-Maloterre-Venus	Deep and very shallow, gently undulating to hilly, well-drained to somewhat excessively drained, clayey and loamy soils that have loamy and clayey subsoils. Found on uplands and terraces. Makes up about 14 percent of soils in Cooke County.
GRAYSON COUNTY	
Normangee-Crockett-Wilson	Deep, nearly level to sloping, very slowly permeable loamy soils with clayey subsoils. Found on ridges and side slopes of uplands. Makes up about 27 percent of soils in Grayson County.
Sanger-Bolar	Deep and moderately deep, gently to strongly sloping, very slowly permeable to moderately permeable, clayey and loamy soils with clayey subsoils. Found on ridges and side slopes of uplands. Makes up about 2 percent of soils in Grayson County.
Callisburg-Crosstell-Gasil	Deep, gently sloping to sloping, moderately permeable to very slowly permeable, loamy and sandy soils that have clayey subsoils. Found on uplands. Makes up about 16 percent of soils in Grayson County.
Aubrey	Moderately deep, gently to strongly sloping, slowly permeable, loamy soils with sandy, loamy, and clayey subsoils. Found on ridgetops and on convex, strongly sloping, upper side slopes of ridges. Makes up about 2 percent of soils in Grayson County.
Bastrop-Okay-Oklared	Deep, nearly level to gently sloping, moderately permeable and moderately rapidly permeable, loamy soils with sandy, loamy, and clayey subsoils. Found on terraces. Makes up about 2 percent of soils in Grayson County.

[1]USDA 1977, 1978a, 1978b, and 1980b
[2]USDA 1979, 1980a

Table 6. Prime Farmland in the Vicinity of Lake Texoma

County, State	Soil Series
Bryan County, OK	Bernow, Boxville, Dennis, Durant, Freestone, Karma, Madill, Muskogee, Okay
Johnston County, OK	Burleson, Dale, Dela, Dennis, Durant, Frioton, Gasil, Gowton, Heiden, Kaufman, Konawa, Lula, Oklared, Ravia, Steedman, Stephenville, Verdigris
Love County, OK	Brewer-Vanoss Complex, Durant, Minco, Pulaski, Teller, Vanoss, Windthorst, Yahola
Marshall County, OK	Bastrop, Burleson, Counts, Durant, Frioton, Heiden, Konawa, Konsil, Madill, Teller
Cooke County, TX	Bolar, Miller, Minco, San Saba-Slidell Complex, Slidell, Slidell-San Saba Complex, Teller, Venus, Yahola
Grayson County, TX	Bastrop, Bolar, Callisburg, Gasil, Okay, Oklared, Sanger

Source: USDA 2000a, 2000b, 2000c, 2002, 2004

4.4.3 Hydrology

Lake Texoma, formed by Denison Dam on the Red River, receives water from the drainage area (approximately 39,719 square miles) of the Red River and the Washita River, its main tributary upstream of the dam. The Red River Arm of the lake is about 60 miles long and the Washita River Arm is about 45 miles long. The gradient of the Red River is approximately 1.6 feet per mile for the entire length of Lake Texoma, while the channel capacity is approximately 45,000 cubic feet per second (cfs) downstream of Denison Dam (Figure 5). From Denison Dam to Fulton, Arkansas, the river flows between high banks about 1,000 feet apart (USACE 1989, 1993a, and 2003a). Releases from the dam are adequate to provide minimum and surge flows that help support the aquatic habitat and wetlands downstream of Lake Texoma.

At normal pool, the lake encompasses more than 89,000 surface acres, which can increase to 143,000 acres at the top of the flood control pool, and more than 580 miles of shoreline. Water storage (for hydropower and flood control purposes) occurs between 590 and 640 feet above MSL. A seasonal pool plan has been implemented at Lake Texoma to enhance recreational opportunities. The plan includes the following (USACE 1993a):

- Drawdown of lake levels to 615 feet above MSL in the late winter and early spring
- Rise to 619 feet above MSL during May and through the summer
- Drawdown to 616.5 feet above MSL in the late summer and early fall
- Rise to 618.5 feet above MSL in late fall and early winter

Table 7 provides the elevations and storage capacity for the pools at Lake Texoma.

Figure 5. Red River Immediately Downstream of Lake Texoma and Denison Dam

Table 7. Water Storage Data for Lake Texoma and Denison Dam

Feature	Elevation (feet)	Reservoir Area (acres)	Reservoir Capacity (acre-feet)[1]
Top of Dam	670	--	--
Top of Flood Control Pool	640	141,418	5,061,062
Flood Control Storage	617 to 640	--	2,544,830[2]
Top of Power Pool	617	74,686	2,516,232
Conservation Storage	590 to 617	--	1,467,283
Bottom of Power Pool	590	--	1,048,949

Source: USACE 2003a

Notes: [1]Includes dead storage in the Cumberland Pool.

[2]Includes 150,000 acre-feet of water supply storage.

The lake inflow carries a large amount of sediment which mostly comes from the Red River. During periods of high flow, bank caving and erosion occur at many locations upstream of Lake Texoma, increasing the sediment load in the lake, and decreasing water storage capacity (USACE 1993a). Recently, a sediment study was completed by the Texas Water Development Board which compared the total volume of water storage available in Lake Texoma from the original design in 1942 with the results of studies conducted in 1969, 1985, and 2002 (TWDB 2003). Table 8 summarizes the results, and illustrates the decrease in water storage capacity in the lake.

Table 8. Comparison of Water Storage Capacity at Lake Texoma (1942–2002)

	1942[1]	1969	1985	2002
Total Volume (acre-feet)	3,132,293	2,688,411	2,580,389	2,516,232
Percentage of Storage Lost	--	8.5%	4.0%	2.5%

Source: TWDB 2003

Note: [1]Original design

Models using projected future sedimentation to the year 2044 (the end of the project life at Lake Texoma) have been run to estimate future water supply availability, assuming full use of the 150,000 acre-feet of existing water supply storage at Lake Texoma. The results of this modeling, which are presented in Appendix B, indicate that future water supply available would be 228.4 cfs.

Appendix B also provides the results of modeling performed by the Tulsa District to determine baseline elevation duration (percent of time a particular lake level was equaled or exceeded), elevation frequency (percent of years a particular lake level was equaled or exceeded), discharge duration (percent of time a particular discharge was equaled or exceeded), and discharge duration (percent of years a particular discharge was equaled or exceeded) at Lake Texoma for the period of 1938 to 2000. Discharge duration and discharge frequency model results are also presented for Arthur City, Texas, downstream of Lake Texoma.

In 1972, amendments to the Clean Water Act (CWA), specifically the establishment of Section 303(d), required states to develop lists of water bodies that do not meet water quality standards and to submit updated lists to the U.S. Environmental Protection Agency (USEPA) every 2 years. USEPA is required to review impaired water body lists submitted by each state and approve or disapprove all or part of the list (OKDEQ 2003).

For water bodies on the 303(d) list, the CWA requires that a pollutant load reduction plan or total maximum daily load (TMDL) be developed to correct each impairment. TMDLs must document the nature of the water quality impairment, determine the maximum amount of a pollutant load which can be discharged and still meet standards, and identify allowable loads from the contributing sources. The elements of a TMDL include a problem statement, description of the desired future condition (numeric target), pollutant source analysis, load allocations, description of how allocations relate to meeting targets, and margin of safety (OKDEQ 2003).

The states of Oklahoma and Texas have yet to develop TMDLs for waters of the Red River, Washita River, or Lake Texoma. The Oklahoma Department of Environmental Quality (OKDEQ) has identified several river segments in the Red and Washita river drainages, as well as the Upper Washita River Arm of Lake Texoma, on their 2002 303(d) list submitted to and approved by USEPA. The Upper Washita River Arm of the lake has been listed due to nonattainment with the warm water aquatic community beneficial use designation (OKDEQ 2002). OKDEQ has listed 2005 as its targeted date for development of TMDLs for all listed segments of the Red River, as well as the Upper Washita River Arm of Lake Texoma. TMDL development is scheduled for 2004 (three segments), 2005 (three segments), and 2009 (four segments) for the Washita River segments on the 303(d) list (OKDEQ 2002).

The Texas Commission on Environmental Quality (TCEQ) released a draft 303(d) list for 2004 on January 15, 2004. This list does not identify any waters of Lake Texoma or the Red River. However, the Upper Prairie Dog Town Fork of the Red River is on the draft 2004 303(d) list for Texas. More

data and information are needed before the TCEQ will schedule the development of a TMDL for this segment (TNRCC 2004).

The National Wetlands Inventory of the U.S. Fish and Wildlife Service classified the majority of wetlands in the vicinity of Lake Texoma in the palustrine system; however, wetlands classified in the lacustrine and riverine systems are also present (USFWS 2004). Wetlands classified as palustrine are nontidal and are dominated by trees, shrubs, emergents, mosses, or lichens. Within these three systems (palustrine, lacustrine, and riverine), wetlands have been further classified as limnetic and littoral (lacustrine); emergent, forested, scrub-shrub, unconsolidated bottom, and unconsolidated shore (palustrine); and lower perennial (riverine). Many of the wetland types have been further classified as diked/impounded or excavated, indicating that they formed under conditions created by humans. The wetlands in the vicinity of Lake Texoma are also subject to different hydrologic regimes, including seasonally flooded, semipermanently flooded, and permanently flooded.

Dominant vegetation found in wetlands of the Tishomingo and Hagerman National Wildlife Refuges, which are adjacent to Lake Texoma, include boxelder (*Acer negundo*), black willow (*Salix nigra* var. *lindheimeri*), cottonwood, sedges, saltgrass (*Distichlis* spp.), native millet (*Panicum miliaceum*), pondweed (*Potamogeton nodosus*), smartweed, arrowleaf *(Sagitaria* spp.), cattail (*Typha* spp.), rushes (*Juncus* spp.), and bulrush (*Scirpus pendulus*). Wetlands provide essential habitat for waterfowl as well as shore birds, wading birds, and several mammal and reptile species (USFWS 2000a, 2000b).

4.4.4 Wild and Scenic Rivers

There are no streams or rivers within the project area that are classified as wild and scenic pursuant to the Federal Wild and Scenic Rivers Act (Public Law 90-542).

4.4.5 Fish and Wildlife

The aquatic, wetland, and upland habitats at Lake Texoma support a diversity of fish and wildlife. The Oklahoma Department of Wildlife Conservation (ODWC) and the Texas Parks and Wildlife Department (TPWD) have the responsibility to manage, regulate, and control fish and wildlife resources for Lake Texoma. There is a cooperative agreement with the U.S. Fish and Wildlife Service to preserve and improve wildlife habitat for the 13,450 acres in Tishomingo National Wildlife Refuge and 11,400 acres in Hagerman National Wildlife Refuge (USACE 2003a). The following four subsections provide a listing of fish and wildlife species that could occur at Lake Texoma.

4.4.5.1 Fish

Management of the fishery resources at Lake Texoma is the responsibility of the ODWC and TPWD. Lake Texoma provides habitat for at least 70 species of fish, several of which were introduced by the ODWC and TPWD (USACE 2003). These agencies maintain a supplemental stocking program to improve the fishery resource. Those species popular for recreational fishing include channel (*Ictalurus punctatus*), blue (*I. furcatus*), and flathead catfish (*Pylodictis olivaris*); largemouth (*Micropterus salmoides*), spotted (*M. punctulatus*), white (*Morone chrysops*), and striped bass; and white crappie (*Pomoxis annularis*). The striped bass fishery at Lake Texoma is extremely popular and is considered one of the most successful striped bass fisheries in the nation. In addition, downstream of the dam is a tailwater fishery that supports striped bass, as well as channel, blue, and flathead catfish. The spawning of striped bass in the Red and Washita rivers is the key to the continued success of this sport fishery (USACE 1989).

Gizzard shad (*Dorosoma cepedianum*), threadfin shad (*D. petenense*), and Mississippi silverside (*Menidia audens*) are considered important forage species in the lake. Freshwater drum (*Aplodinotus grunniens*), carp (*Cyprinus carpio*), gar (*Lepisosteus* spp.), buffalo (*Ictiobus* spp.), and river carpsucker (*Carpiodes carpio*) make up the bulk of rough fishes in the lake (USACE 1989).

4.4.5.2 Amphibians and Reptiles

Numerous amphibians and reptiles are known to occur at Lake Texoma. Species of amphibians that are supported include salamander (*Ambystoma* spp.), plains and eastern spadefoot toad (*Scaphiopus bombifrons* and *S. holbrookii*, respectively), gray tree frog (*Hyla versicolor*), chorus frog (*Pseudacris* spp.), bullfrog (*Rana catesbeiana*), and the southern leopard frog (*R. pipiens*). Reptile species at Lake Texoma include snapping turtle (*Chelydra sepentina*), box turtle (*Terrapene* spp.), eastern fence lizard (*Sceloporus undulatus*), Texas horned lizard (*Phrynosoma cornutum*), water snake (*Natrix* spp.), Texas brown snake (*Storeria dekayi*), common garter snake (*Thamnophis sirtalis*), eastern hognose snake (*Heterodon platyrhinos*), black rat snake (*Elaphe obsoleta*), copperhead (*Agkistrodon contortrix*), western diamondback rattlesnake (*Crotalus atrox*), and the western pigmy rattlesnake (*Sistrurus miliarius*) (USACE 2003a).

4.4.5.3 Birds

The variety of habitats at Lake Texoma support numerous species of migratory waterfowl and wading birds, upland game birds, raptors, and songbirds. These include mallards (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), blue-winged teal (*A. discors*), pintail (*A. acuta*), great blue heron (*Ardea herodias*), little blue heron (*Florida caerulea*), turkey (*Meleagris gallopavo*), northern bobwhite (*Colinus virginianus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), crows (*Corvus brachyrhynchos*), killdeer (*Charadrius vociferous*), yellow-billed cuckoo (*Coccyzus americanus*), red-bellied woodpecker (*Centurus carolinus*), purple martin (*Progne subis*), barn swallow (*Hirundo rustico*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*P. bicolor*), Eastern bluebird (*Sialia sialis*), Northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), lark sparrow (*Chondestes grammacus*), Northern cardinal (*Richmondena cardinalis*), painted bunting (*Passerina ciris*), dickcissel (*Spiza americana*), red-winged blackbird (*Agelaius phoeniceus*), Eastern meadowlark (*Sturnella magna*), brown-headed cowbird (*Molothrus ater*), scissor-tailed flychatcher (*Muscivora forfic*), and American robin (*Turdus migratorius*) (USACE 2003a).

4.4.5.4 Mammals

A variety of small mammals, bats, carnivores/omnivores, and ungulates occur at Lake Texoma, including the thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), opossum (*Didelphis marsupialis*), least shrew (*Cryptotis parva*), eastern harvest mouse (*Reithrodontomys humulis*), deer mouse (*Peromyscus maniculatus*), eastern cottontail (*Sylvilagus floridanus*), red bat (*Lasiurus borealis*), evening bat (*Nycticeius humeralis*), striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), red fox (*Vulpes fulva*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) (USACE 2003a).

4.4.6 Threatened and Endangered Species

Consultation was initiated in July 2003 (USACE 2003b) with the U.S. Fish and Wildlife Service (Service) regarding listed species with the potential to be affected by USACE activities on the Arkansas, Canadian, and Red Rivers in Arkansas, Oklahoma, and Texas; and on the McClellan-Kerr Arkansas River Navigation System in Arkansas and Oklahoma. A Biological Assessment (BA) was prepared by the USACE and submitted to the Service (USACE 2003b) as part of this consultation.

The BA included the proposed Lake Texoma storage reallocation and is incorporated by reference in this EA.

The USACE narrowed the list of 16 species provided by the Service for the consultation down to seven species with the potential to occur at Lake Texoma or in the Red River System below Denison Dam. Table 9 provides the list of these species and their status.

Table 9. Threatened and Endangered Species with the Potential to Occur at Lake Texoma or in the Red River System Below Denison Dam.

Common Name	Scientific Name	Status: (T) Threatened, (E) Endangered
Bald eagle	*Haliaeetus leucocephalus*	T
Interior least tern	*Sterna antillarum*	E
Whooping crane	*Grus americana*	E
Piping plover	*Charadrius melodius*	T
American alligator	*Alligator mississippiensis*	T
Scaleshell mussel	*Leptodea leptodon*	E
American burying beetle	*Nicrophorus americanus*	E

The bald eagle and interior least tern are known to occur in the project area. Downstream of Lake Texoma, interior least terns utilize sandbar habitats for nesting and loafing and the adjacent shallow water habitat for feeding on minnows. Bald eagles are common winter residents along the shores of Lake Texoma and are also known to nest in this area (USACE 2003b). They use tall trees near water for foraging, roosting, and nesting, and are also known to nest in cliffs.

The whooping crane and piping plover are considered migrants in the vicinity of Lake Texoma. Whooping cranes, which are considered rare spring and fall migrants in this area, use emergent vegetation along the edges of marshes, prairie pothole wetlands, or lakes for nesting sites; croplands for foraging; and riverine wetlands for roosting. While it is possible that whooping cranes use the available habitat at Lake Texoma and along the Red River below Denison Dam, historical records indicate that they primarily use the habitat along the river upstream of the lake. Lake Texoma is located in the migration corridor of the piping plover, and it is possible that this species uses mudflats associated with the Red River in the vicinity of Lake Texoma. However, there are no records of locations used frequently by this species for the project area. (USACE 2003b).

The American alligator uses rivers, swamps, lakes, and marshes, digging dens in riverbanks or shorelines of lakes. Although this species is considered a possible transient in the lower portion of the Red River, it does not appear to be found near Lake Texoma (USACE 2003b).

The scaleshell mussel is found in larger creeks and small to medium size rivers with good water quality, in riffles with moderate to high gradients. In Oklahoma, recent surveys in the Red River basin failed to find this species. Although habitat for this species is likely to be supported in the project area, it does not appear that the scaleshell mussel is found near Lake Texoma (USACE 2003b).

The American burying beetle is known to occur in several counties along or near Lake Texoma. Little is known about the habitat requirements of this species, however, in Oklahoma, it has been found in habitats ranging from deciduous and coniferous forests to open pasture. Surveys for the American burying beetle have been conducted on the Washita River Arm of Lake Texoma, but have not resulted in collection of this species (USACE 2003b). Since it is known to occur in the vicinity of the lake, and because it is a highly mobile species, it could occur in suitable habitat at Lake Texoma.

4.5 Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act of 1966 (as amended), the appropriate agencies and Native American tribes were contacted via written correspondence (dated February 15, 2001) to discuss potential impacts on cultural resources. The Tulsa District mailed letters to the Oklahoma Historical Society State Historic Preservation Office, the Oklahoma Archeological Survey, and the Texas Historical Commission, as well as the Wichita and Affiliated Tribes of Oklahoma, the Choctaw Nation of Oklahoma, the Chickasaw Nation of Oklahoma, and the Caddo Indian Tribe of Oklahoma (Appendix D). In these letters, the Tulsa District established the position that there would be "no effect" on cultural resources as a result of the Lake Texoma storage reallocation project.

The Oklahoma Historical Society responded on March 6, 2001, indicating that this project is not subject to consultation requirements because there would be no construction or earth-moving activities. The Oklahoma Archeological Survey responded on February 28, 2001, that the project should have no impact on the prehistoric cultural or archeological resources of Oklahoma. Finally, the Texas Historical Commission responded on March 2, 2001, indicating their concurrence with the "no effect" determination and that the project may proceed. Each agency response is documented in Appendix D. None of the tribes contacted have provided comments on the project. Section 106 coordination is therefore complete for this project.

4.6 Air Quality

USEPA published a Conformity Rule on November 30, 1993, requiring all Federal actions to conform to appropriate State Implementation Plans (SIPs) that were established to improve ambient air quality. National Ambient Air Quality Standards exist for six pollutants: carbon monoxide, ozone, respirable particulate matter (including particulates equal to or less than 10 microns in diameter [PM_{10}] and particulate matter equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide, nitrogen oxides, and lead). In July 1997, the 8-hour ozone standard was promulgated and the existing 1-hour ozone standard was remanded for all areas, except those designated nonattainment with the 1-hour standard when the 8-hour standard was adopted. Implementation of this new standard was delayed due to legal challenges; however, on April 15, 2004, USEPA promulgated the Final Implementation Rule and designated as nonattainment those areas that exceeded the 8-hour ozone standard throughout the country.

These "criteria pollutants" are the only pollutants for which standards have been established. USEPA assigns designations, based on an area's meeting, or "attaining" these standards. At this time, the Conformity Rule only applies to Federal actions in nonattainment areas. A nonattainment area is an area that does not meet one or more of the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act (CAA).

The project area is within the Oklahoma counties of Love, Bryan, Marshall, and Johnston; and the Texas counties of Grayson and Cooke. According to maps in the USEPA "Green Book" (for criteria pollutant nonattainment areas), all counties within Oklahoma have been designated as attainment

areas for criteria pollutants and air toxins, including the 8-hour ozone standard (USEPA 2004) The TCEQ maintains information on SIPs related to air quality in Texas' nonattainment areas. Grayson and Cooke counties have been designated attainment areas for all criteria pollutants and air toxins, including the 8-hour ozone standard (TNRCC 2002).

A conformity analysis based on air emissions analysis is required for any proposed Federal action within a nonattainment area. Since the geographical region potentially affected by the Lake Texoma storage reallocation project is in attainment and meets the National Ambient Air Quality Standards for the criteria pollutants designated in the CAA, a conformity determination is not required.

4.7 Hazardous, Toxic, and Radiological Wastes

Potential pollution sources in the vicinity of Lake Texoma include sewage disposal/treatment systems (septic tanks and other subsurface disposal systems, as well as municipal sewage treatment plants), private cabins and concession operations, boats, sanitary landfills, open dumps, water treatment plants, animal production facilities, and oil production facilities (USACE 1996a, 2003a).

Of these potential sources, oil production facilities present the greatest threat to Lake Texoma. Several active oil fields are on or surrounding government property, while hundreds of transport pipelines cross government property and surface waters that feed Lake Texoma. To date, none of these sources have had an effect on Lake Texoma (USACE 1996a, 2003a).

4.8 Noise

Noise sources at Lake Texoma are primarily affiliated with recreation activities and include motor boats, motor vehicles, hunting, and people at the marinas, campgrounds, and other recreational facilities surrounding the lake. Operation of the hydropower facilities represents another source of noise at the lake.

5 Environmental Impacts of the Proposed Action

A summary of environmental impacts is presented in Table 10 (page 21).

5.1 Socioeconomics

5.1.1 No Action Alternative

5.1.1.1 Population

Under the No Action Alternative, population trends of the past decade would continue. Population dynamics would be influenced by economic and recreational opportunities in the counties surrounding Lake Texoma, while the demand for residential lands would continue to be linked to future population dynamics. The 150,000 acre-feet of water currently in water supply would continue to be available to help service current and future populations of southern Oklahoma and northern Texas.

5.1.1.2 Employment and Income

The employment rate in the social area would remain similar to the state levels for both Oklahoma and Texas. The educational, health, and social services; manufacturing; and retail trade sectors would be expected to continue as an important part of the economy in this area. Recreational services and

oil and gas exploration would be expected to increase in their importance for the local economy. Municipal, industrial, and agricultural opportunities would continue to be limited to the 150,000 acre-feet of water currently available in water supply storage at Lake Texoma.

Income in the defined social area would continue to be near or below the state averages. The current allocation of water supply storage at Lake Texoma would not be expected to influence income in the counties surrounding Lake Texoma.

5.1.1.3 Social Ecology

The area would continue to be primarily a mix of residential, agricultural lands, and business. Demand for new residential developments would increase the transition of agricultural lands into residential areas. The area would continue to be a center for recreation.

5.1.2 Proposed Action

5.1.2.1 Population

Reallocation of 300,000 acre-feet from hydropower to water supply storage would have a direct effect on the population of the social area. Although it would not affect overall population growth trends in southern Oklahoma and northern Texas, this additional water supply would be available for new industrial, agricultural, and municipal users in this area. This could promote growth of business-related opportunities and residential development in the social area, which could cause small, local changes in population.

5.1.2.2 Employment and Income

The employment rate in the social area would continue to remain similar to the state levels for both Oklahoma and Texas. Some new job opportunities might become available associated with new opportunities from the additional water supply storage. These would likely be in the residential development (e.g., construction), recreation (e.g., golf courses), retail (e.g., restaurants), agricultural, and oil and gas industries.

The educational, health, and social services; manufacturing; and retail trade sectors are expected to continue to be an important part of the economy in this area. New business opportunities in the social area would not appreciably affect income because they would be similar to existing enterprises (e.g., construction, recreation, retail, agricultural, and oil and gas).

5.1.2.3 Social Ecology

The reallocation of hydropower storage to water supply storage would reinforce the social ecology of this area as primarily a mix of residential, agricultural, and business. Increased demand for new residential developments would increase the transition of agricultural lands into residential areas. The area would continue to be a center for recreation.

5.2 Natural Resource Impacts

5.2.1 No Action Alternative

Under the No Action Alternative, conditions at Lake Texoma would remain status quo. There would be no impacts on terrestrial resources, soils, and prime farmland; hydrology; fish and wildlife; or threatened or endangered species.

Table 10. Impact Assessment Matrix

Name of Parameter	Magnitude of Probable Impact						
	Increasing Beneficial Impact			No Appreciable Effect	Increasing Adverse Impact		
	Significant	Substantial	Minor		Minor	Substantial	Significant
SOCIAL EFFECTS							
Noise Levels				X			
Aesthetic Values				X			
Recreational Opportunities				X			
Transportation				X			
Public Health and Safety			X				
Community Cohesion (Sense of Unity)				X			
Community Growth and Development			X				
Business and Home Relocations			X				
Existing/Potential Land Use			X				
Controversy				X			
ECONOMIC EFFECTS							
Property Values				X			
Tax Revenues				X			
Public Facilities and Services			X				
Regional Growth			X				
Employment			X				
Business Activity			X				
Farmland/Food Supply			X				
Flooding Effects				X			

Table 10. Impact Assessment Matrix (continued)

Name of Parameter	Magnitude of Probable Impact						
	Increasing Beneficial Impact			No Appreciable Effect	Increasing Adverse Impact		
	Significant	Substantial	Minor		Minor	Substantial	Significant
NATURAL RESOURCE EFFECTS							
Air Quality				X			
Terrestrial Habitat				X			
Wetlands				X			
Aquatic Habitat					X		
Habitat Diversity and Interspersion				X			
Biological Productivity					X		
Surface Water Quality				X			
Water Supply		X					
Groundwater				X			
Soils				X			
Threatened and Endangered Species				X			
CULTURAL RESOURCES							
Historic Architectural Values				X			
Prehistoric & Historic Archeological Values				X			

5.2.2 Proposed Action

5.2.2.1 Terrestrial

Construction and earth-moving activities would not be associated with the storage reallocation project at Lake Texoma. Reductions in elevation duration, elevation frequency, discharge duration, and discharge frequency (see Section 5.2.2.3, Hydrology) would not be expected to have effects on terrestrial resources such as upland plant communities. Because the Proposed Action does not involve raising lake levels, there is no concern for additional flooding or backwater effects that would have an impact on terrestrial resources upstream of Lake Texoma.

5.2.2.2 Soils and Prime Farmland

Although soils classified as prime farmland do exist in the project area, there would be no effects from the storage reallocation at Lake Texoma. None of these soils would be converted to different uses (i.e., taken out of agricultural production), nor would they be affected by the reductions in elevation duration, elevation frequency, discharge duration, or discharge frequency.

5.2.2.3 Hydrology

Reallocation of storage in Lake Texoma would result in negligible changes to elevation duration, elevation frequency, discharge duration, or discharge frequency at Lake Texoma. Using data from the period of record (1938 to 2000), model outputs for the Proposed Action (see Appendix B) indicate that elevation frequency, or the percent of years in which a given lake elevation is equaled or exceeded, would not change perceptibly (reduced by less than 1 percent) with implementation of the Proposed Action (see Figure 2 in Appendix B). These models also indicate that elevation duration, or the percent of time for which a given lake elevation is exceeded, would not change perceptibly (reduced by less than 1 percent) when lake elevations are approximately 617 feet above MSL or higher (see Figure 3 in Appendix B). Below this elevation, elevation duration would decrease by approximately 3 to 8 percent under the Proposed Action. For example, under current conditions, elevations of approximately 613 feet are exceeded approximately 85 percent of the time; under the Proposed Action, this elevation would be exceeded approximately 80 percent of the time.

These changes could reduce the amount of water available in hydropower storage. In addition, reallocating 300,000 acre-feet from hydropower storage would reduce water available to the hydropower pool by approximately 20 percent, from 1,467,283 acre-feet to 1,167,283 acre-feet. The water lost as a result of reallocation from hydropower to water supply storage would no longer be available to run through the turbines of the hydropower operation, and would represent a reduction in downstream discharges. Based on the results of the modeling, however, discharge frequency, or the percent of years in which a given discharge would be equaled or exceeded, would not change perceptibly (reduced by approximately 1 to 2 percent) for discharges above 3,500 cfs (see Figure 4 in Appendix B). The frequency of discharges below this rate would be reduced slightly further, but not by more than 5 percent, with implementation of the Proposed Action. The model results also show that discharge duration, or the percent of time for which a given discharge would be equaled or exceeded, would also be only slightly reduced. This change would be the most pronounced for discharges between 600 and 7,000 cfs, where discharge duration would be reduced by approximately 3 to 8 percent under the Proposed Action (see Figure 5 in Appendix B). For example, under current conditions, discharges of 2,000 cfs are equaled or exceeded approximately 52 percent of the time. Under the Proposed Action, these discharges would be equaled or exceeded approximately 45 percent of the time. Outside of this 600 to 7,000 cfs range, changes in discharge duration are imperceptible (reduced by approximately 2 percent or less).

In addition, modeling of discharge duration and frequency at Arthur City, Texas, approximately 95 miles downstream of Lake Texoma, indicates that the effects of the Proposed Action are reduced the further one travels below the lake. According to the model results, there would be imperceptible changes in discharge frequency (see Figure 6 in Appendix B) and discharge duration would be reduced by less than 5 percent (see Figure 7 in Appendix B).

The reduction in elevation duration and frequency at Lake Texoma is not expected to affect aquatic or wetland habitat adversely. Although lake levels might be reduced slightly, this could result in the creation of wetlands in areas that were previously flooded. Backwater effects (e.g., flooding) on aquatic and wetland habitat at and upstream of the lake are not anticipated.

The reduction in discharge duration and frequency could affect aquatic and wetland habitat downstream of Lake Texoma and Denison Dam (e.g., pools along the Red River that provide aquatic habitat could be shallower at times, and wetlands dependent on periodic inundation might receive less water as a result of lower flows). However, as the model results for Arthur City indicate, the effects would be reduced as one travels further downstream from the lake. Additionally, regulation of flows on the Red River is an authorized project purpose at Lake Texoma. Low-flow releases, in combination with normal discharges for hydropower generation, generally ensure that some water passes through the aquatic and wetland habitat of the Red River downstream of Lake Texoma. Finally, during drought conditions, drought contingency plans would be implemented (see Section 6.0, Mitigation Plan) to ensure that adequate water is available for conservation purposes, including downstream discharges to maintain minimum water flows in the Red River, which in turn support aquatic habitat and wetlands.

Because the Proposed Action does not involve raising lake levels, there is no concern for additional flooding or backwater effects that would have an impact on aquatic and wetland habitat upstream of Lake Texoma.

Although water supply could come from a slightly lower level in the lake when compared to current withdrawals, this would not have an appreciable effect on water quality at Lake Texoma. Effects on thermal gradients, as well as chemical water quality parameters (e.g., total dissolved solids, dissolved oxygen), are not anticipated, and would be imperceptible if they did occur. The reductions in discharge duration and frequency could adversely affect dissolved oxygen levels just downstream of Lake Texoma. However, low-flow releases and discharges for hydropower generation would help maintain dissolved oxygen, as well as reduce periods of no flow and stagnation even further downstream in the Red River. The Proposed Action would not change the potential for erosion and sedimentation at Lake Texoma or in the Red River. Overall, water quality would not be affected in the lake or the Red River, and the Proposed Action would not affect the designation of 303(d) waters or the development of TMDLs in the states of Oklahoma or Texas.

No wetland or water quality permits would be required for implementation of the Proposed Action (see Appendix E).

5.2.2.4 Fish and Wildlife

Construction and earth-moving activities are not necessary to implement the storage reallocation project at Lake Texoma, and upland wildlife habitat and species would be unaffected. Reductions in elevation duration, elevation frequency, discharge duration, and discharge frequency (as discussed in Section 5.2.2.3, Hydrology) could have impacts on wildlife that use the aquatic and wetland habitat available in the lake and the Red River. A reduction in elevation duration and frequency at the lake could result in the formation of new wetlands, which would provide important wildlife habitat (especially for fish and amphibians) in areas that were previously inundated. Although this could

result in the loss of shoreline aquatic habitat for wading birds/waterfowl, fish, and amphibians, the effects would be imperceptible given the extent of this habitat at Lake Texoma. In addition, the implementation of seasonal pool plans that benefit wildlife would continue to cause periodic inundation of these areas, temporarily restoring such habitat. Therefore, the Proposed Action is not anticipated to significantly affect wildlife or their habitat at the lake.

Under the Proposed Action, reductions in discharge duration and frequency from the lake are not expected to significantly affect wildlife or their habitat downstream of Lake Texoma. These reductions could, at times, cause pools that provide habitat for fish along the Red River to be shallower; however, impacts would be negligible. Wetlands dependent on periodic inundation might receive less water as a result of lower flows. However, the effect diminishes as one travels further from the lake, as indicated in the modeling results for Arthur City, Texas discussed in Section 5.2.2.3. In addition, low-flow releases and discharges for hydropower generation would ensure that some water passes through the aquatic and wetland habitat of the Red River downstream of Lake Texoma.

Because the Proposed Action does not involve raising lake levels, there is no concern for additional flooding or backwater effects that would have an impact on wildlife upstream of Lake Texoma.

5.2.2.5 Threatened and Endangered Species

Reductions in discharge duration and frequency are not anticipated to affect the hydrologic conditions that create sandbar habitats used by interior least terns downstream of Lake Texoma. In addition, modified releases from the dam are made to enhance or maintain interior least tern habitat, and would continue under the Proposed Action as necessary (USACE 2002). Because there would be no construction-related activities that could impact interior least terns (e.g., heavy equipment noise or habitat loss) and because potential changes to downstream discharges would have no impacts, the Proposed Action would have no effect on interior least terns downstream of Lake Texoma.

Reductions in elevation duration and frequency at Lake Texoma would not result in the loss of shoreline habitat (e.g., large trees near the water) that supports bald eagles. In addition, there would be no construction-related activities that could impact bald eagles (e.g., noise from heavy-equipment or tree removal). There would be no changes in water quality that could affect the prey base of the bald eagle under this alternative. Therefore, the Proposed Action would have no effect on bald eagles at Lake Texoma.

Although habitat for the whooping crane and piping plover is supported in the project area, historical records indicate that they occur primarily as migrants in the vicinity of Lake Texoma. Regardless, reductions in discharge duration and frequency are not anticipated to affect the hydrologic conditions that create the wetland and mudflat areas downstream of the lake that may be used by these species. The modified releases for least tern management would also ensure that the hydrology downstream of Lake Texoma is maintained, as necessary. Reductions in elevation duration and frequency at Lake Texoma would not significantly affect the shoreline habitat that may be used by whooping cranes. In fact, a reduction in elevation duration and frequency at the lake could result in the formation of new wetlands, which could provide additional nest areas for whooping cranes. Because there would be no construction-related activities that could impact whooping cranes and piping plovers (e.g., heavy equipment noise or habitat loss), because potential changes to discharge or elevation duration and frequency would have no impact on their habitat, and because there would be no changes in water quality that could affect the prey base of either species, the Proposed Action would have no effect on these species.

Impacts on the American alligator and scaleshell mussel are not anticipated under the Proposed Action, as these species are not likely to occur in the project area. In addition, changes in discharge

or elevation duration and frequency at Lake Texoma are not anticipated to alter the potential habitat for these species. There would be no changes in water quality that could affect the prey base of these species under this alternative. Therefore, the Proposed Action would have no effect on the American alligator or scaleshell mussel.

Although the American burying beetle has the potential to occur at Lake Texoma, the Proposed Action would not affect the terrestrial environment in which this species is supported (upland plant communities). Therefore, the Proposed Action is not anticipated to have significant effects on this species.

Because the Proposed Action does not involve raising lake levels, there is no concern for additional flooding or backwater effects that would have an impact on threatened or endangered species that might occur upstream of Lake Texoma.

In a letter dated October 5, 2004 (Appendix C), the Service concurred with these determinations, indicating that they do not anticipate any federally-listed species to be adversely affected by the proposed storage reallocation. They stated that the Proposed Action was covered in the USACE BA (USACE 2003b) and that compliance with Section 7 of the Endangered Species Act has been addressed in the subsequent biological opinion issued by the Service.

5.3 Cultural Resources

5.3.1 No Action Alternative

Under the No Action Alternative, there would be no impact on cultural resources.

5.3.2 Proposed Action

As outlined in Section 4.6, Section 106 coordination under the National Historic Preservation Act is complete; no impacts on cultural resources are expected as a result of the Proposed Action. Refer to Appendix D for cultural resources coordination.

5.4 Air Quality

5.4.1 No Action Alternative

Under the No Action Alternative, conditions at Lake Texoma would remain status quo. There would be no impact on air quality.

5.4.2 Proposed Action

The Proposed Action would not result in any effects on air quality.

5.5 Hazardous, Toxic, and Radiological Wastes

5.5.1 No Action Alternative

Under the No Action Alternative, conditions at Lake Texoma would remain status quo. There would be no impacts on hazardous, toxic, and radiological wastes.

5.5.2 Proposed Action

The proposed storage reallocation at Lake Texoma would not result in any effects on hazardous, toxic, and radiological wastes in the project area.

5.6 Noise

5.6.1 No Action Alternative

Under the No Action Alternative, conditions at Lake Texoma would remain status quo. There would be no impacts on the noise environment.

5.6.2 Proposed Action

The proposed storage reallocation at Lake Texoma would not result in any effects on noise in the project area.

5.7 Cumulative Impacts

No cumulative impacts are anticipated to occur as a result of the Proposed Action.

6 Mitigation Plan

Regulation of flows on the Red River is an authorized project purpose at Lake Texoma. Normally, low-flow and hydropower releases are made through the turbines. In the late summer, dissolved oxygen levels can become too low to support certain species of fish. If dissolved oxygen monitoring indicates that levels are at a critical point, a low flow release of 50 cfs is discharged through one of the flood-control conduits. Water released in this manner becomes highly aerated, and has proven effective in maintaining dissolved oxygen levels to prevent fish kills (USACE 1993b).

During drought conditions, a Drought Contingency Plan is implemented at Lake Texoma (USACE 1993b). This plan is designed to provide coordination and intensify actions as drought increases in severity, with four levels of response to be progressively initiated as the drought intensifies. This plan ensures that all of the project purposes, including flood control, water supply, hydroelectric power, downstream flow regulation, improvement to navigation, and recreation, are not compromised during drought conditions.

Different types of releases for interior least tern management are made during the nesting season as opposed to the non-nesting season. While lake levels are maintained for implementation of the Seasonal Pool Plan, hydropower generation, and flood control, minimum-flow releases are made throughout the nesting season (June through July, and sometimes into August) to protect interior least tern nesting sites. The objective is to provide enough flow to prevent land-bridging of sandbar islands to reduce nesting losses due to predation and human activities. During the 2001 nesting season, the average flow requirement to protect interior least terns below Lake Texoma was 5,000 cfs. Every 2 to 3 years, high-flow releases are made during non-nesting periods (August through May), to inundate and scour sandbar islands, thereby removing vegetation, depositing silt and sand, and enhancing important interior least tern habitat (USACE 2002).

7 Federal, State, and Local Agency Coordination

The draft EA was coordinated with the following agencies having legislative and administrative responsibilities for environmental protection. Copies of the correspondence from those agencies that provided comments and planning assistance for preparation of the draft EA are in the appendices. The mailing list for the 30-day public review period for this EA is in Appendix A.

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Department of Agriculture
Oklahoma Water Resources Board
Oklahoma Department of Environmental Quality
Oklahoma Department of Wildlife Conservation
Oklahoma Historical Society State Historic Preservation Office
Oklahoma Archeological Survey
Texas Water Development Board
Texas Parks and Wildlife Department
Texas Commission on Environmental Quality
Red River Authority
Texas Historical Commission
Wichita and Affiliated Tribes of Oklahoma
Choctaw Nation of Oklahoma
Chickasaw Nation of Oklahoma
Caddo Indian Tribe of Oklahoma
Quapaw Tribe of Oklahoma

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9 Applicable Environmental Laws and Regulations

Table 11. Relationship of Plans to Environmental Protection Statutes and Other Environmental Requirements

Federal Policies	Compliance of Alternatives
Archeological and Historic Preservation Act, 1974, as amended, 16 U.S.C. 469, et seq.	Full compliance
Clean Air Act, as amended, 42 U.S.C. 7609, et seq.	Full compliance
Clean Water Act, 1977, as amended (Federal Water Pollution Control Act, 33 U.S.C. 1251), et seq.	Full compliance
Endangered Species Act, 1973, as amended, 16 U.S.C. 1531, et seq.	Full compliance
Farmland Protection Policy Act, 7 U.S.C. 4201, et seq.	Full compliance
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1-12, et seq.	Full compliance
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq.	Full compliance
Land and Water Conservation Fund Act, 1965, as amended, 16 U.S.C. 4601, et seq.	Full compliance
National Historic Preservation Act, 1966, as amended, 16 U.S.C. 470a, et seq.	Full compliance
National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq.	Full compliance
Native American Graves Protection and Repatriation Act, 1990, 25 U.S.C. 3001-13, et seq.	Full compliance
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	Not applicable
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	Not applicable
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq.	Not applicable
Water Resources Planning Act, 1965	Not applicable
Water Resources Development Act of 1986 , Public Law 99-662	Full compliance
Environmental Justice (Executive Order 12898)	Full compliance
Floodplain Management (Executive Order 11988)	Full compliance
Protection of Children From Environmental Health Risks and Safety Risks (Executive Order 13045)	Full compliance
Protection of Wetlands (Executive Order 11990)	Full compliance

Note: "Full compliance" means that all requirements have been met of the statutes, Executive Orders, or other environmental requirements for the current stage of planning.

10 List of Preparers

This EA has been prepared under the direction of Mr. Jerry Sturdy and Ms. Jan Hottubbee of the U.S. Army Corps of Engineers, Tulsa District. Individuals from engineering-environmental Management, Inc. (e^2M) who contributed to the preparation of this document are listed below.

Louise Baxter
M.P.A. Public Administration
B.S. Political Science
Years of Experience: 18

Sarah Boyes
B.S. Biology
Years of Experience: 2

Brian Hoppy – Program Manager
B.S. Biology
Certificate of Environmental Management
Years of Experience: 14

Dan Niosi
B.A. Environmental Studies/Natural Science
Years of Experience: 5

Dan Savercool – Project Manager
M.S. Biological Oceanography
B.A. Zoology/Marine Science
A.A.S. Natural Resources Conservation
Certified Senior Ecologist, ESA
Certified Forest Stand Delineator
Years of Experience: 20

Mary Young
B.S. Environmental Science
Years of Experience: 2

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APPENDIX A

COORDINATION/CORRESPONDENCE

Mailing List for Lake Texoma Water Reallocation EA

Mr. Jerry Brabander
Field Supervisor
U.S. Fish & Wildlife Service
222 South Houston, Suite A
Tulsa, OK 74127

Mr. Richard E. Greene
Federal Region VI Administrator
Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Mr. Darrel Dominick
State Conservationist
USDA Agri-Center Bldg
100 USDA, Suite 206
Stillwater, OK 74074-2655

Mr. Greg D. Duffy
Director
Oklahoma Dept. of Wildlife Conservation
P.O. Box 53465
Oklahoma City, OK 73105

Mr. Duane A. Smith
Executive Director
Oklahoma Water Resources Board
P.O. Box 150
Oklahoma City, OK 73101-0150

Mr. Mark S. Coleman
Executive Director
Oklahoma Department of
Environmental Quality
1000 Northeast 10th Street
Oklahoma City, OK 73117-1212

Dr. Bob Blackburn
State Historic Preservation Officer
Oklahoma Historical Society
2704 Villa Prom, Shepherd Mall
Oklahoma City, OK 73107

Dr. Robert Brooks
State Archeologist
Oklahoma Archeological Survey
111 East Chesapeake
Norman, OK 73019

Mr. Robert Cook
Executive Director
Texas Parks & Wildlife Department
4200 Smith School Road
Austin, TX 78744

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Mr. Curtis W. Campbell
General Manager
Red River Authority of Texas
Hamilton Building
900 8th Street, Suite 520
Wichita Falls, TX 76301-6894

Mr. Glenn Shankle
Executive Director
Texas Commission on
Environmental Quality
MC 109
P.O. Box 13087
Austin, TX 78711

Mr. F. Lawrence Oaks
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

Mr. Michael A. Deihl
Administrator
Southwestern Power Administration
One West Third Street
Tulsa, OK 74102

Ms. Ramona Clark
Executive Director
Lake Texoma Association
P.O. Box 610
Kingston, OK 73439

Mr. Gary McAdams
Wichita and Affiliated Tribes of Oklahoma
P.O. Box 729
Anadarko, OK 73005

Mr. Gregory Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Drawer 1210
Durant, OK 74720

Mr. Bill Anoatubby, Governor
Chickasaw Nation of Oklahoma
P.O. Box 1548
Ada, OK 74821

Ms. Stacy Halfmoon
Caddo Indian Tribe of Oklahoma
P.O. Box 487
Binger, OK 73009

Mr. John Berrey, Chairman
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363

US Army Corps of Engineers ®
Tulsa District

DRAFT
NEWS RELEASE

For Immediate Release

To: News Directors, Assignment Editors, and Editors

Synopsis: The U.S. Army Corps of Engineers will host a public workshop to discuss the Lake Texoma Reallocation Study.

Release No. 03-xx
September 2003

Workshops to present the Lake Texoma Reallocation Study

TULSA, Okla. -- The Tulsa District, U.S. Army Corps of Engineers will host public information workshops on Tuesday, September 16, and Wednesday, September 17th 2003, to provide information to the public and solicit comments and questions about the Lake Texoma Reallocation Study.

The Corps of Engineers study will evaluate the water supply storage alternatives to address the increased demand in the area. The goal is to determine the best method to provide the necessary storage. The purpose of the study is to address the need in the area for additional water supply storage, formulate a variety of alternatives, and select a recommended plan of action or non-action.

On September 16, the workshop will be held at Denison Public Library, 300 W. Gandy, Denison, Texas, and on September 17 the workshop will be held at the Durant Chamber of Commerce, 215 N. 4th Street, Durant, Oklahoma. Each workshop will be held from 5:00 p.m. to 8:00 p.m. and will be an open house format with no set or formal presentations. Everyone is invited to attend, visit information tables and discuss the project with representatives from the Corps' Tulsa District.

The workshop and comment solicitation are part of the environmental documentation (scoping), conducted in compliance with the National Environmental Policy Act. Scoping is the process of identifying potential environmental impacts of proposed Federal actions by soliciting comments and questions from the public and government agencies.

For more information on this study, contact Mr. David Combs in the Tulsa office, 918-669-7660.

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Paid Advertisement

~Announcing~

PUBLIC INVOLVEMENT WORKSHOP
as related to the
Lake Texoma Reallocation Study
in compliance with
The National Environmental Policy Act

Open House

The U.S. Army Corps of Engineers will host two public workshops to provide the public information about the Lake Texoma Reallocation Study and to solicit comments and questions on the project. The workshop will be open house format, with no set or formal presentation. Interested persons may arrive anytime between 5:00 - 8:00 p.m., visit the information tables, discuss the study with Corps personnel, and make comments. The workshops will be held at the following locations:

Denison Open House
Denison Public Library
300 W. Gandy
Denison, Texas
Tuesday, September 16, 2003
5:00 - 8:00 p.m.

Durant Open House
Durant Chamber of Commerce
215 N. 4th Street
Durant, Oklahoma
Wednesday, September 17, 2002
5:00 - 8:00 p.m.

Scoping Process

The workshop is part of an effort by the Corps to inform the public about the reallocation study in progress. The purpose of the study is to address the need in the area for additional water supply storage, formulate a variety of alternatives, and select a recommended plan of action or non-action. This public workshop is in compliance with the National Environmental Policy Act. As part of the scoping process, the Corps of Engineers requests that the public, interested parties, Federal, State and local agencies take part in the planning process by identifying issues related to the study and provide input in the development of alternatives to address the water supply storage issues. The Corps will include this input as it develops reallocation alternatives for Lake Texoma. Comments and questions can be forwarded to:

Mr. David Combs
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-PE-E
1645 S. 101st East Avenue
Tulsa, OK 74128-4609
Phone: 918-669-7660
E-mail: David.L.Combs@usace.army.mil

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Darrel Dominick
State Conservationist
USDA Agri-Center Bldg
100 USDA, Suite 206
Stillwater, OK 74074-2655

Dear Mr. Dominick:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

Under the Proposed Action, pool elevations at Lake Texoma would not be changed. In accordance with the Water Resources Development Act of 1986, 300,000 acre-feet of water currently in hydropower storage would be reallocated to water supply storage. The reallocation would provide up to 150,000 additional acre-feet for municipal, industrial, and agricultural water users in the State of Oklahoma and up to 150,000 additional acre-feet for municipal, industrial, and agricultural water users in the State of Texas.

We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this Proposed Action.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Richard E. Greene
Federal Region VI Administrator
Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Dear Mr. Greene:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this proposed action.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Mark S. Coleman
Executive Director
Oklahoma Department of Environmental Quality
1000 Northeast 10th Street
Oklahoma City, OK 73117-1212

Dear Mr. Coleman:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Greg D. Duffy
Director
Oklahoma Department. of Wildlife Conservation
P.O. Box 53465
Oklahoma City, OK 73105

Dear Mr. Duffy:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

Under the Proposed Action, pool elevations at Lake Texoma would not be changed. In accordance with the Water Resources Development Act of 1986, 300,000 acre-feet of water currently in hydropower storage would be reallocated to water supply storage. The reallocation would provide up to 150,000 additional acre-feet for municipal, industrial, and agricultural water users in the State of Oklahoma and up to 150,000 additional acre-feet for municipal, industrial, and agricultural water users in the State of Texas.

We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning fish and wildlife species of concern that might occur in the project area.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Duane A. Smith
Executive Director
Oklahoma Water Resources Board
P.O. Box 150
Oklahoma City, OK 73101-0150

Dear Mr. Smith:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this Proposed Action.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Curtis W. Campbell
General Manager
Red River Authority of Texas
Hamilton Building
900 8th Street, Suite 520
Wichita Falls, TX 76301-6894

Dear Mr. Campbell:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Michael A. Deihl
Administrator
Southwestern Power Administration
One West Third Street
Tulsa, OK 74102

Dear Mr. Deihl:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this Proposed Action.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Ms. Margaret Hoffman
Executive Director
Texas Commission on Environmental Quality
MC 109
P.O. Box 13087
Austin, TX 78711

Dear Ms. Hoffman:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this Proposed Action.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Robert Cook
Executive Director
Texas Parks & Wildlife Department
4200 Smith School Road
Austin, TX 78744

Dear Mr. Cook:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning fish and wildlife species of concern that might occur in the project area.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Dear Mr. Ward:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this Proposed Action.

If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

April 26, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Jerry Brabander
Field Supervisor
U.S. Fish & Wildlife Service
222 South Houston, Suite A
Tulsa, OK 74127

Dear Mr. Brabander:

This is to inform you that the Tulsa District has begun studying the reallocation of water storage at Lake Texoma, Oklahoma and Texas. We are beginning the process of preparing an Environmental Assessment addressing the effect of reallocation to provide additional water supply storage. The study is being conducted under authority of the Water Resources Development Act of 1986 (Public Law 99-662). The Water Resources Development Act authorized the Secretary of the Army to reallocate 300,000 acre-feet of water at Lake Texoma for municipal, industrial, and agricultural water users in both Oklahoma and Texas.

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We are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate comments from your agency concerning this Proposed Action.

Your comments are requested in accordance with the Fish and Wildlife Coordination Act and the Endangered Species Act. If you have any questions or require additional information, please contact Mr. Jerry Sturdy at 918-669-4397.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

TEXAS WATER DEVELOPMENT BOARD

May 3, 2004

Larry D. Hogue, P.E.
Chief, Planning Environmental and Regulatory Division
Department of the Army
Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Re: Reallocation of water storage at Lake Texoma

Dear Mr. Hogue:

Thank you for your information on the progress of the study to reallocate water storage in Lake Texoma.

As demand for water in the state of Texas increases, it is important that we look for ways to increase supply while minimizing the impact to the environment. The Texas Water Development Board (TWDB) has a keen interest in this project as it may have implications across the state. Flood reallocation from reservoirs may be the most cost-effective and least environmentally disruptive way of meeting water demand in Texas. We look forward to the completion of the study and to the discussion of the findings.

The TWDB Hydrographic Survey crew surveyed this lake for the Corps of Engineers during the summer of 2002 and a final report was submitted in April 2003. If you have any questions regarding this work, or if the TWDB can be of any assistance, please do not hesitate to contact me, or the Director of the Surface Water Resources Division Director, Dr. Barney Austin (Tel: 512-463-8856).

Sincerely,

J. Kevin Ward
Executive Administrator

DUANE A. SMITH
EXECUTIVE DIRECTOR

BRAD HENRY
GOVERNOR

STATE OF OKLAHOMA
WATER RESOURCES BOARD
www.owrb.state.ok.us

May 25, 2004

Mr. Larry Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division
Environmental Analysis and Compliance Branch
Department of the Army
Corps of Engineers, Tulsa District
Tulsa, OK 74128-4609

Re: Proposed reallocation – Lake Texoma

Dear Mr. Hogue:

Thank you for the opportunity to comment on the proposed reallocation of the storage at Lake Texoma.

As you know, the State of Oklahoma is a party to the Red River Compact. Accordingly, the State of Oklahoma has a significant interest in ensuring compliance with the apportionment provisions of the Red River Compact. Article IV of the Compact, specifically Section 4.04, apportions the water of the mainstem of the Red River and Lake Texoma between the State of Oklahoma and the State of Texas. Basically, the Compact apportions the storage of Lake Texoma and flow of the mainstem of the Red River into Lake Texoma on a 50/50 basis between Oklahoma and Texas. Any reallocation of storage at Lake Texoma must be consistent with the apportionment provisions of the Compact.

Unfortunately, the Compact Commission has not finalized rules to implement the apportionment provisions of the Compact. Until such rules are adopted by the Commission, it will not be possible to determine whether a proposed reallocation of storage is consistent with the Compact's apportionment provisions. The Oklahoma Commissioners and Texas Commissioners of the Red River Compact Commission are aware of the need for rules, and we hope to consider proposed rules at the Commission's annual meeting scheduled during April, 2005. Staff of the Corps' Tulsa District are routinely invited to the Commission's annual meetings, and therefore, will be notified of the Commission's determination regarding the apportionment rules.

A related issue that should be addressed in the reallocation study is the costs of the water supply storage. It is our understanding that the original water supply storage allocation for Lake Texoma was 150,000 acre-feet. Therefore, under the terms of the 50/50 apportionment provision, the Compact apportions 75,000 acre-feet of the original water supply storage

OWRB
3800 N. CLASSEN BOULEVARD • OKLAHOMA CITY, OKLAHOMA 73118 • TELEPHONE (405) 530-8800 • FAX (405) 530-8900

allocation to Oklahoma and the other 75,000 acre-feet to Texas. Based on plain readings of the Water Supply Act of 1986 and the Red River Compact, we believe that Oklahoma users remain entitled to enter into contracts for up to a total of 75,000 acre-feet of water supply storage under terms and conditions available prior to the Water Supply Act of 1986. An explanation is in order.

Section 838 of the Water Resources Development Act of 1986 provides authority for the Corps to reallocate 300,000 acre-feet of storage in Lake Texoma from hydropower to water supply, with 150,000 acre-feet for Oklahoma users and 150,000 acre-feet for Texas users (this is consistent with the 50/50 apportionment provision of the Compact). Paragraph (d)(1) of Section 838 then indicates that all contracts for the reallocated storage shall be under the new water supply contract terms set forth in Section 932, which terms are substantially less favorable than terms in contracts entered pursuant to the Water Supply Act of 1958. However, paragraph (e) of Section 838 controls the situation by providing that nothing in Section 838 of the Water Resources Development Act of 1986 shall be construed as amending or altering in any way the Red River Compact. As noted above, the Red River Compact split the storage at Lake Texoma and flow from the mainstem of the Red River on a 50/50 basis, as follows: "Oklahoma 200,000 acre-feet and Texas to 200,000 acre-feet, which quantities shall include existing allocations and uses" (emphasis added). The emphasized language in the Compact makes it clear that the 50/50 apportionment provision of the Compact applies to the original 150,000 acre-feet allocation for water supply storage. Therefore, Oklahoma users are entitled to contract for up to 75,000 acre-feet of the original allocation amount without triggering less favorable repayment terms that will apply to contracts for the reallocated storage.

The Environmental Assessment should address both the apportionment rules to be adopted by the Compact Commission and the costs of the storage.

Please keep us informed of the progress of the Environmental Assessment work. Thank you again for the opportunity to provide input.

Sincerely,

Duane A. Smith
Executive Director

cc: Secretary Miles Tolbert
Charles Dobbs, Oklahoma Commissioner
Mark Nichols
Gordon W. Fassett, Federal Commissioner
William A. Abney, Texas Commissioner
Randy Young, Arkansas Commissioner

APPENDIX B

SUPER MODEL OUTPUTS

Updating Red River SUPER Model: Lake Texoma Yield Analysis and Water Supply Reallocation

Overview of SUPER Model

The SUPER Model is a suite of computer programs written for use in the Southwestern Division of the U.S. Army Corps of Engineers to model multi-purpose reservoir system regulation. The programs were developed over a thirty-year period by Ronald L. Hula, primarily as a planning tool to perform period-of-record analysis, to evaluate changes in operational scenarios. The model has the ability to simulate flood control operations, and conservation pool operations including hydropower, water supply, water quality, diversions, and returns. In addition to period-of-record analysis, it has the capability to perform conservation pool yield analysis, and firm energy analysis. It also has the capability to develop unregulated conditions models, simulating systems with some or all reservoirs "dummied" out or non-existent. Besides system modeling, SUPER can perform economic analyses of impacts between plans. It can also provide a wide variety of output from which to evaluate scenarios including tabular or graphical formats of hydrographs, duration plots, and frequency curves at all reservoirs and control points within the system model.

SUPER is a daily simulation model that assumes all reservoirs are in place for the entire period of record specified for each model, based on data availability. For each SUPER model, a complex set of intervening area flows is developed for the entire period of record. This is the culmination of the pre-processing of data, before any simulation is done. When simulation is begun, headwater reservoir inflows and subsequent derived releases based on current and future forecast conditions, are then routed through the system on a daily basis. These routed flows are combined with intervening area flows at all control point locations. Reservoir releases are made for flood control, hydroelectric power generation, water supply requirements, and stream flow requirements such as water quality and irrigation. Other regulating considerations include channel capacities and bank stability. All releases are analyzed to determine their impact on current and future forecasted conditions, and are adjusted as needed to meet predefined system constraints. In addition to the above requirements, SUPER works to achieve a target uniform balance between all competing reservoirs during the draw down of system flood storage, and a target uniform balance in system conservation storage remaining during a conservation pool draw down. SUPER has evolved to meet the complex challenge of modeling system operations while meeting system and local constraints, and balancing requirements.

SUPER Hydrologic Development

Prior to this study, the Red River SUPER model had a hydrologic period-of-record from January 1938 to December 1990. Although there had not been any significant floods along the Red River through most of the 1990's, there had been some drier years, and enough additional years of record, that the model needed to be updated. The goal of this update was to extend the period of record to 2000.

This required collecting and formatting an additional ten years of daily inflows for the 20 reservoirs within the model, and daily flows for numerous flow gages used to develop the period-of-record hydrology. Monthly evaporation and precipitation at numerous locations was also collected and formatted. The data was extracted as much as possible from the USGS published data. Reservoir inflows, data for unpublished gages, and some evaporation data was taken from the internal Corps of Engineers databases. All required data was input into the Red River SUPER database.

After the Red River SUPER database was updated and complete, extensive editing of the hydrologic files was done to incorporate and utilize the additional ten years of daily data that was available. Hydrologic building files were then run through a series of programs to develop the updated period-of-record hydrology or local flows.

With the updated hydrology files, a natural conditions run, simulating no reservoirs in place, was made. As a final check to spot errors in building the hydrology file, a volume checking program was run, which performs a volume comparison between the natural condition flows developed from SUPER and observed gaged flow data. This required building an extensive input file to perform the volume checking analysis. Problems were corrected as required.

Texoma Yield Analysis Using SUPER

With the updated SUPER model, it was desired to determine the true yield of the conservation storage available at the end of the project life. The yield of the conservation storage is required to determine the critical dependable water supply demand that will occur if the entire reallocated storage is used for water supply. This will provide a worse case demand for water supply during the critical drought. At Lake Texoma the conservation storage lies between El. 590 and 617. The end of the project life at Texoma is the year 2044. The water supply yield run was made using an updated elevation-area-capacity table based on the 2002 sediment resurvey of Lake Texoma, with projected future sedimentation to the year 2044. This projected future storage is considered "usable storage". The true yield of the conservation storage at Lake Texoma for the projected 2044 conditions was determined to be 1502.5 cfs. The critical dependable yield for the conservation storage allocated to water supply is determined based on the following equation:

$$\text{Critical Dependable Yield for Allocated Water Supply Storage} = \frac{\text{Total Allocated Water Supply Storage}}{\text{Total "Usable" Conservation Storage(in 2044)}} * \text{True Yield}$$

$$\text{For the full 300,000 ac-ft reallocation, the Critical Dependable Water Supply Yield} = \frac{\text{150,000 ac-ft (past) + 300,000 ac-ft (present)}}{\text{986,730 ac-ft}} * \text{1502.5 cfs}$$

$$= 685.2 \text{ cfs or } 442.1 \text{ mgd}$$

Current water supply contracts based on the 1985 sediment survey with sediment projections to the year 2044 will need to be updated to the current "usable storage" based on the 2002 sediment survey at Texoma.

Texoma Water Supply Reallocation Runs Using SUPER

Three SUPER runs were made to model impacts at Texoma due to the current reallocation of hydropower to water supply. The critical dependable water supply demand is the only input parameter that varies between the runs. The runs made are as follows:

(1) Existing conditions in which the full 150,000 ac-ft previously reallocated from hydropower to water supply at Texoma is utilized. The water supply demand modeled = 228.4 cfs

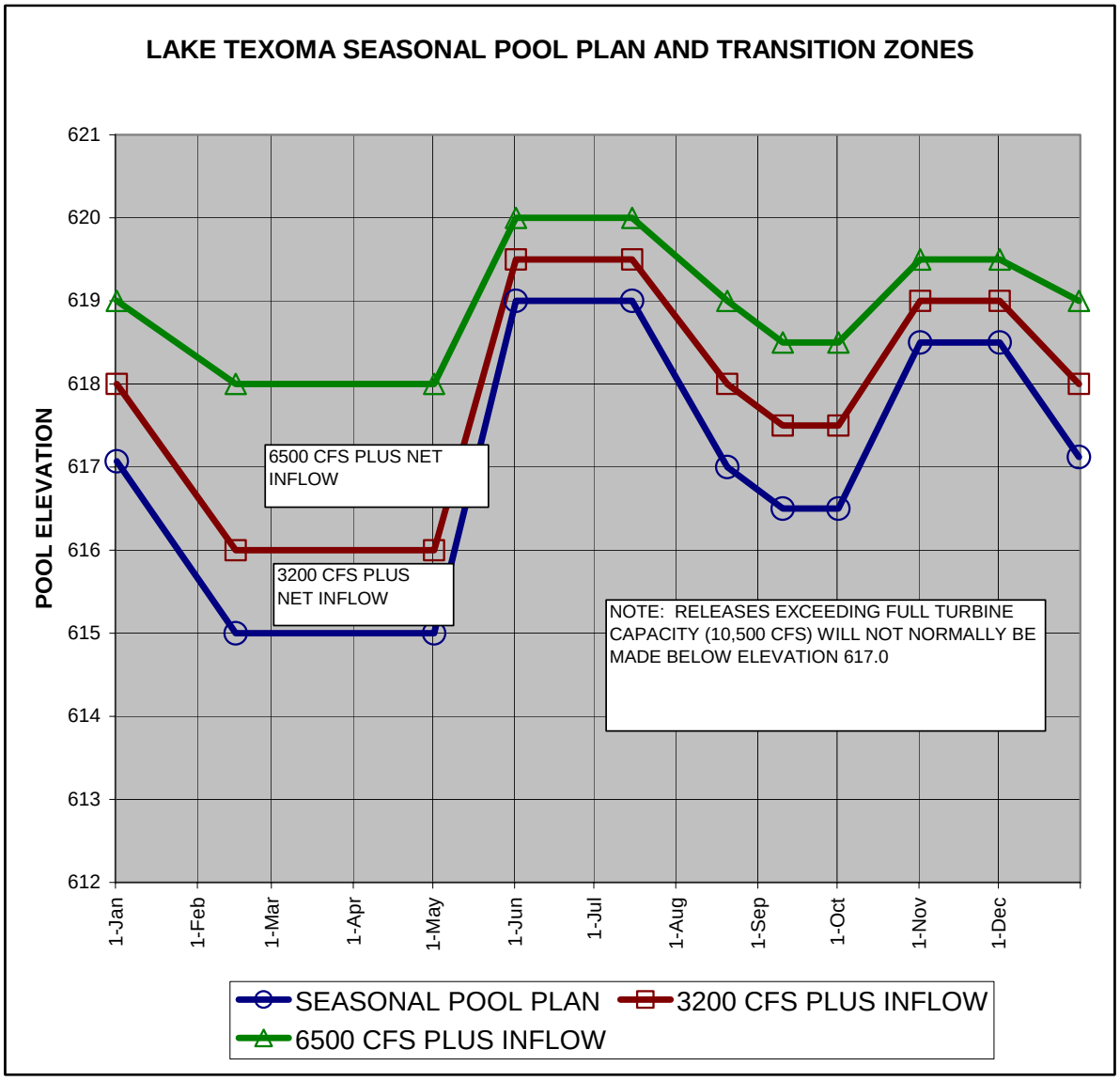
(2) Modified conditions in which the previous 150,000 ac-ft of reallocated water supply storage is utilized at Texoma plus half of the current Texoma water supply reallocation of 300,000 ac-ft (150,000 ac-ft for Texas and 150,000 ac-ft for Oklahoma). Therefore the total water supply demand for Texoma modeled in this run is 300,000 ac-ft. This

modified conditions run basically models Texas fully utilizing their water supply demand. The water supply demand modeled = 456.8 cfs

(3) Modified conditions in which the previous 150,000 ac-ft of reallocated water supply storage is utilized at Texoma plus all of the current Texoma water supply reallocation of 300,000 ac-ft. The total water supply demand for Texoma modeled in this run is 450,000 ac-ft. This run models fully utilized water supply conditions at Texoma or the worst case scenario, for demands on Texoma. The water supply demand modeled = 685.2 cfs.

These runs were all done with the updated 2002 Lake Texoma Elevation-Area-Capacity table, with the updated Texoma seasonal pool guide curve (see Figure 1), and the extended period of record hydrology through 2000. To avoid too large a drawdown at Texoma with the larger water supply demands, Southwest Power Administration modified their hydropower loads input into SUPER, to reflect more realistically how they would operate, given the greater water supply demands. Therefore, these runs reflect modified hydropower loads for each scenario. The water supply demand at Texoma is modeled as a constant year-round demand. Results of the runs are provided in graphical form as attachments.

Figure 1. Texoma Seasonal Pool



ATTACHMENTS

Figure 2 **Texoma Comparative Elevation-Frequency Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 3 **Texoma Comparative Elevation-Duration Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 4 **Texoma Outflow Comparative Flow-Frequency Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 5 **Texoma Outflow Comparative Flow-Duration Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 6 **Arthur City Comparative Flow-Frequency Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 7 **Arthur City Comparative Flow-Duration Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 8 **Texoma Comparative Minimum Elevation-Frequency Curve between Super Runs A03X07A, A03X08A, and A03X09A**

Figure 9 **Arthur City Comparative Minimum Flow-Frequency Curve between Super Runs A03X07A, A03X08A, and A03X09A**

FIGURE 2

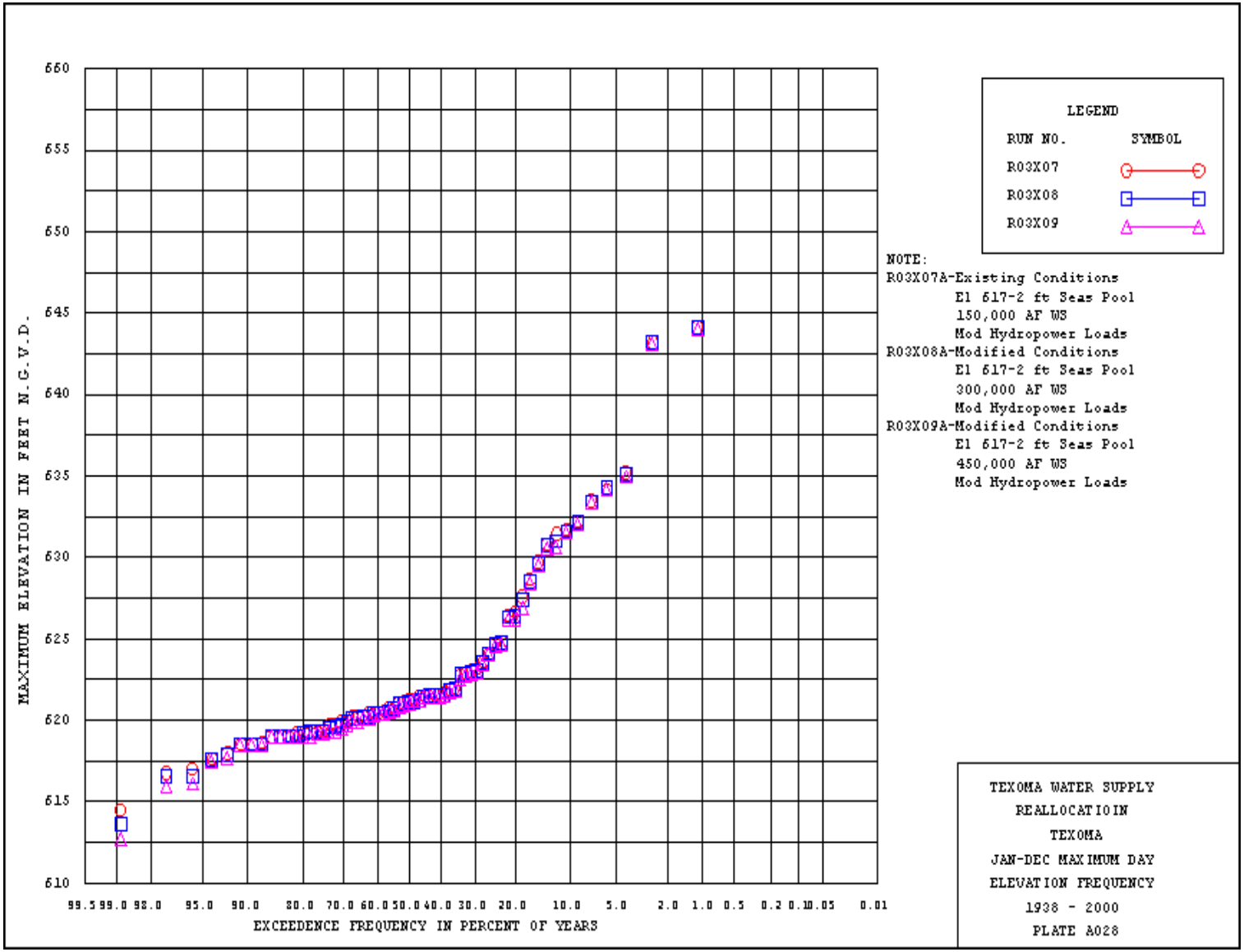

MAXIMUM ELEVATION IN FEET N.G.V.D.
660
655
650
645
640
635
630
625
620
615
610
99.5 99.0 98.0 95.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 5.0 2.0 1.0 0.5 0.2 0.1 0.05 0.01
EXCEEDENCE FREQUENCY IN PERCENT OF YEARS
LEGEND
RUN NO. SYMBOL
R03X07
R03X08
R03X09
NOTE:
R03X07A-Existing Conditions
El 617-2 ft Seas Pool
150,000 AF WS
Mod Hydropower Loads
R03X08A-Modified Conditions
El 617-2 ft Seas Pool
300,000 AF WS
Mod Hydropower Loads
R03X09A-Modified Conditions
El 617-2 ft Seas Pool
450,000 AF WS
Mod Hydropower Loads
TEXOMA WATER SUPPLY
REALLOCATIOIN
TEXOMA
JAN-DEC MAXIMUM DAY
ELEVATION FREQUENCY
1938 - 2000
PLATE A028

FIGURE 3

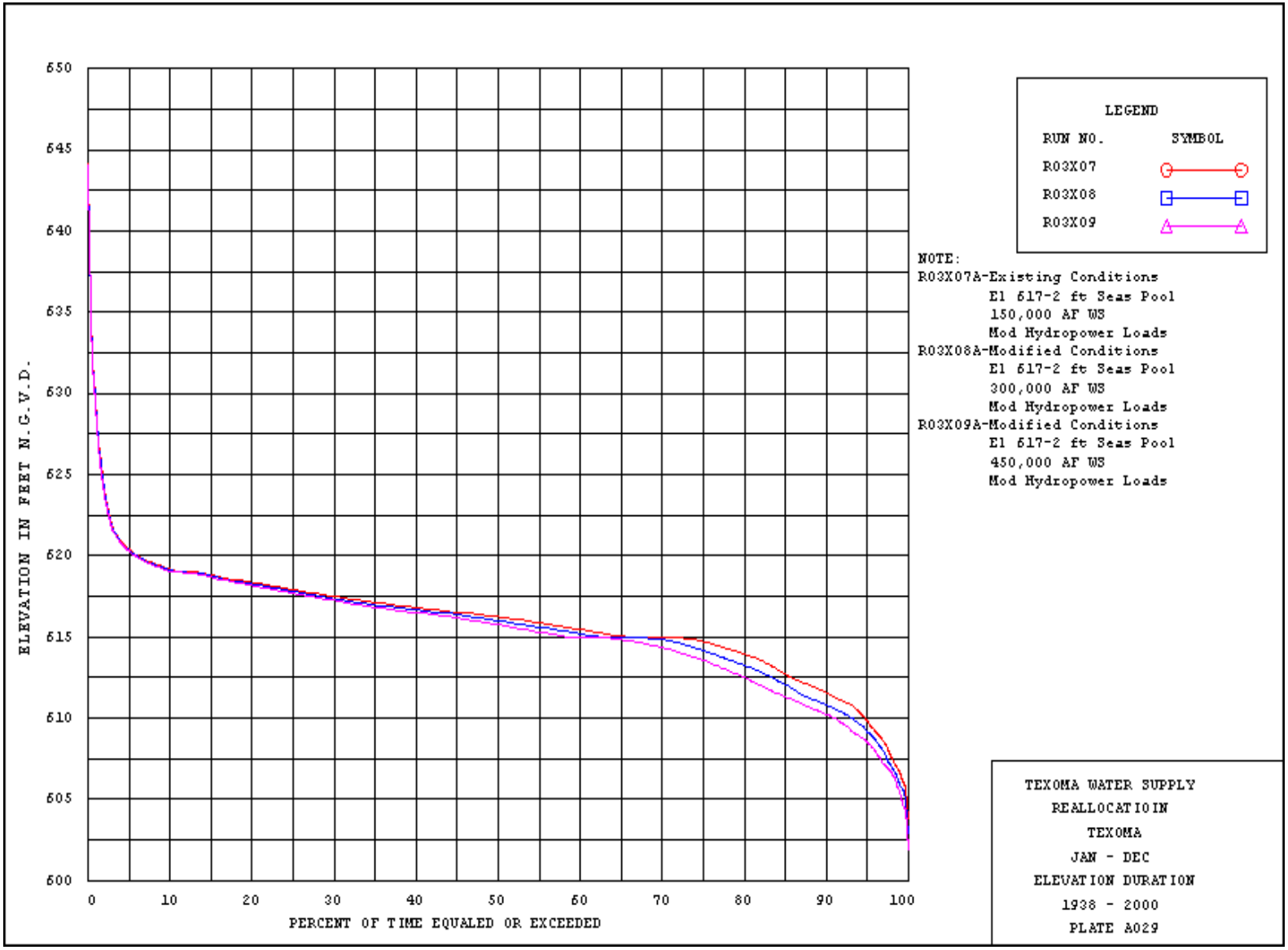

650
645
640
635
630
625
620
615
610
605
600
ELEVATION IN FEET N.G.V.D.
0
10
20
30
40
50
60
70
80
90
100
PERCENT OF TIME EQUALED OR EXCEEDED
LEGEND
RUN NO.
SYMBOL
R03X07
R03X08
R03X09
NOTE:
R03X07A-Existing Conditions
El 617-2 ft Seas Pool
150,000 AF WS
Mod Hydropower Loads
R03X08A-Modified Conditions
El 617-2 ft Seas Pool
300,000 AF WS
Mod Hydropower Loads
R03X09A-Modified Conditions
El 617-2 ft Seas Pool
450,000 AF WS
Mod Hydropower Loads
TEXOMA WATER SUPPLY
REALLOCATIOIN
TEXOMA
JAN - DEC
ELEVATION DURATION
1938 - 2000
PLATE A029

FIGURE 4

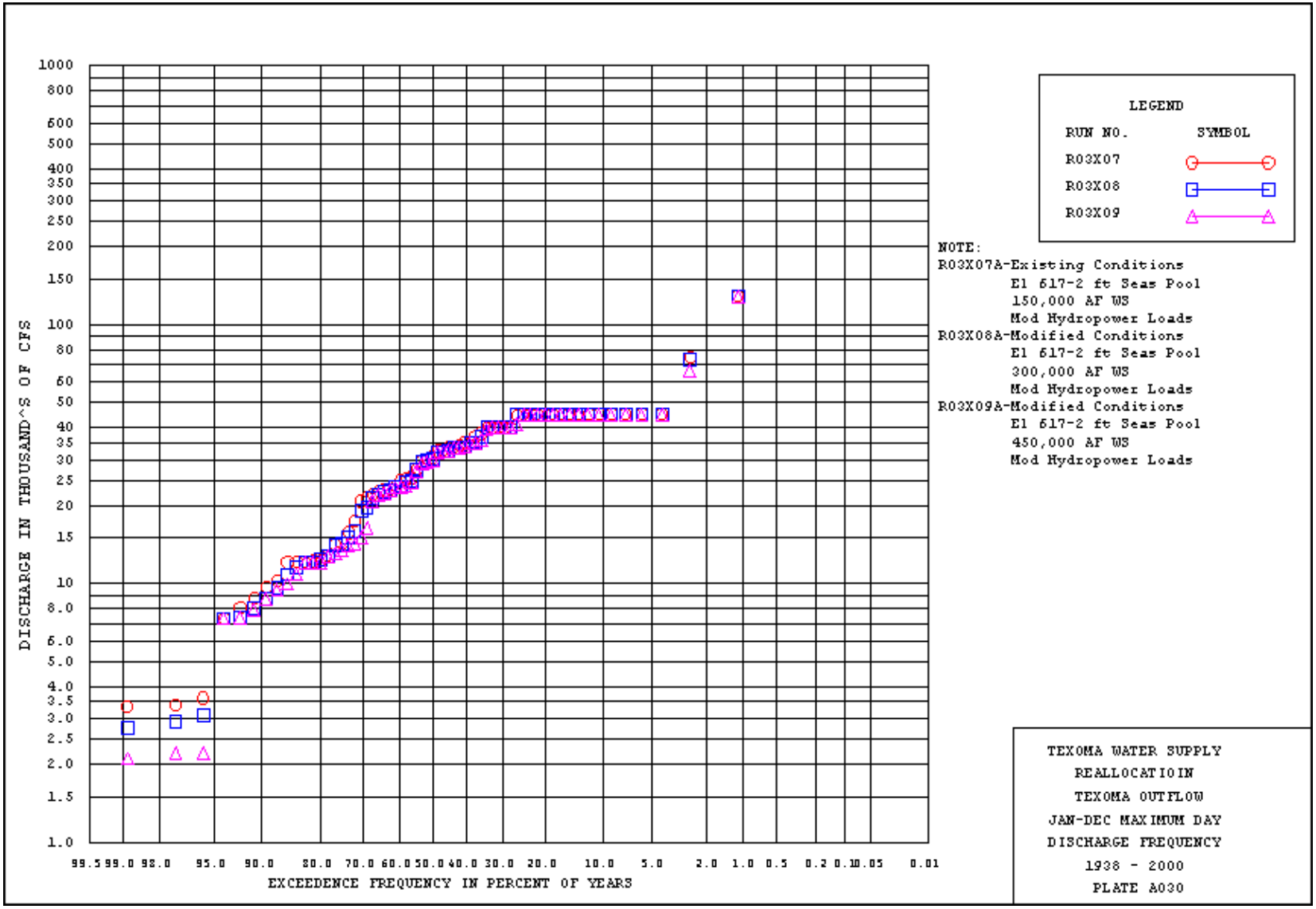

DISCHARGE IN THOUSAND^S OF CFS
1000
800
600
500
400
350
300
250
200
150
100
80
60
50
40
35
30
25
20
15
10
8.0
6.0
5.0
4.0
3.5
3.0
2.5
2.0
1.5
1.0
99.5 99.0 98.0 95.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 5.0 2.0 1.0 0.5 0.2 0.1 0.05 0.01
EXCEEDENCE FREQUENCY IN PERCENT OF YEARS
LEGEND
RUN NO. SYMBOL
R03X07
R03X08
R03X09
NOTE:
R03X07A-Existing Conditions
El 617-2 ft Seas Pool
150,000 AF WS
Mod Hydropower Loads
R03X08A-Modified Conditions
El 617-2 ft Seas Pool
300,000 AF WS
Mod Hydropower Loads
R03X09A-Modified Conditions
El 617-2 ft Seas Pool
450,000 AF WS
Mod Hydropower Loads
TEXOMA WATER SUPPLY
REALLOCATION
TEXOMA OUTFLOW
JAN-DEC MAXIMUM DAY
DISCHARGE FREQUENCY
1938 - 2000
PLATE A030

FIGURE 5

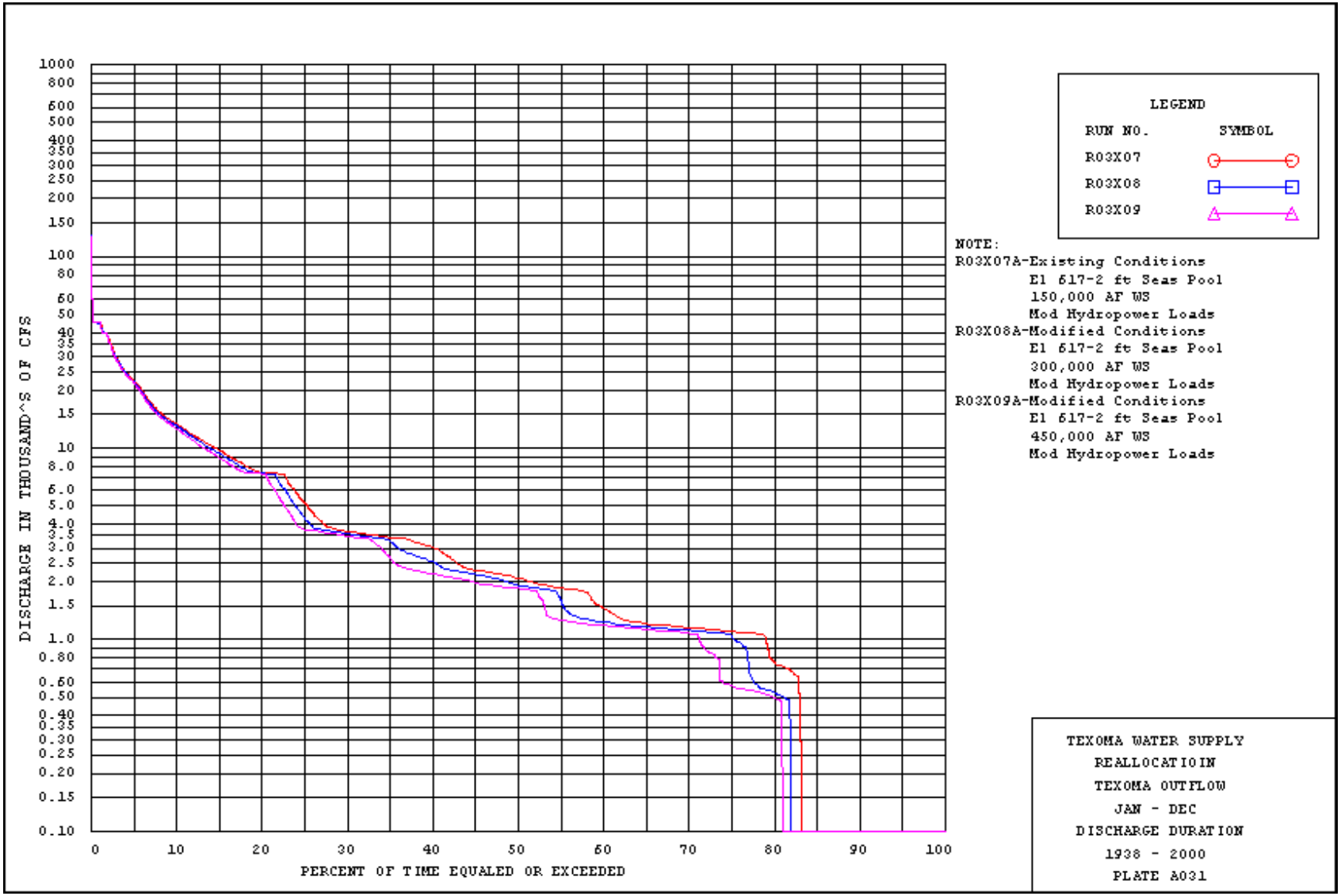

DISCHARGE IN THOUSAND^S OF CFS
1000
800
600
500
400
350
300
250
200
150
100
80
60
50
40
35
30
25
20
15
10
8.0
6.0
5.0
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.80
0.60
0.50
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0
10
20
30
40
50
60
70
80
90
100
PERCENT OF TIME EQUALED OR EXCEEDED
LEGEND
RUN NO.
SYMBOL
R03X07
R03X08
R03X09
NOTE:
R03X07A-Existing Conditions
El 617-2 ft Seas Pool
150,000 AF WS
Mod Hydropower Loads
R03X08A-Modified Conditions
El 617-2 ft Seas Pool
300,000 AF WS
Mod Hydropower Loads
R03X09A-Modified Conditions
El 617-2 ft Seas Pool
450,000 AF WS
Mod Hydropower Loads
TEXOMA WATER SUPPLY
REALLOCATIOIN
TEXOMA OUTFLOW
JAN - DEC
DISCHARGE DURATION
1938 - 2000
PLATE A031

FIGURE 6

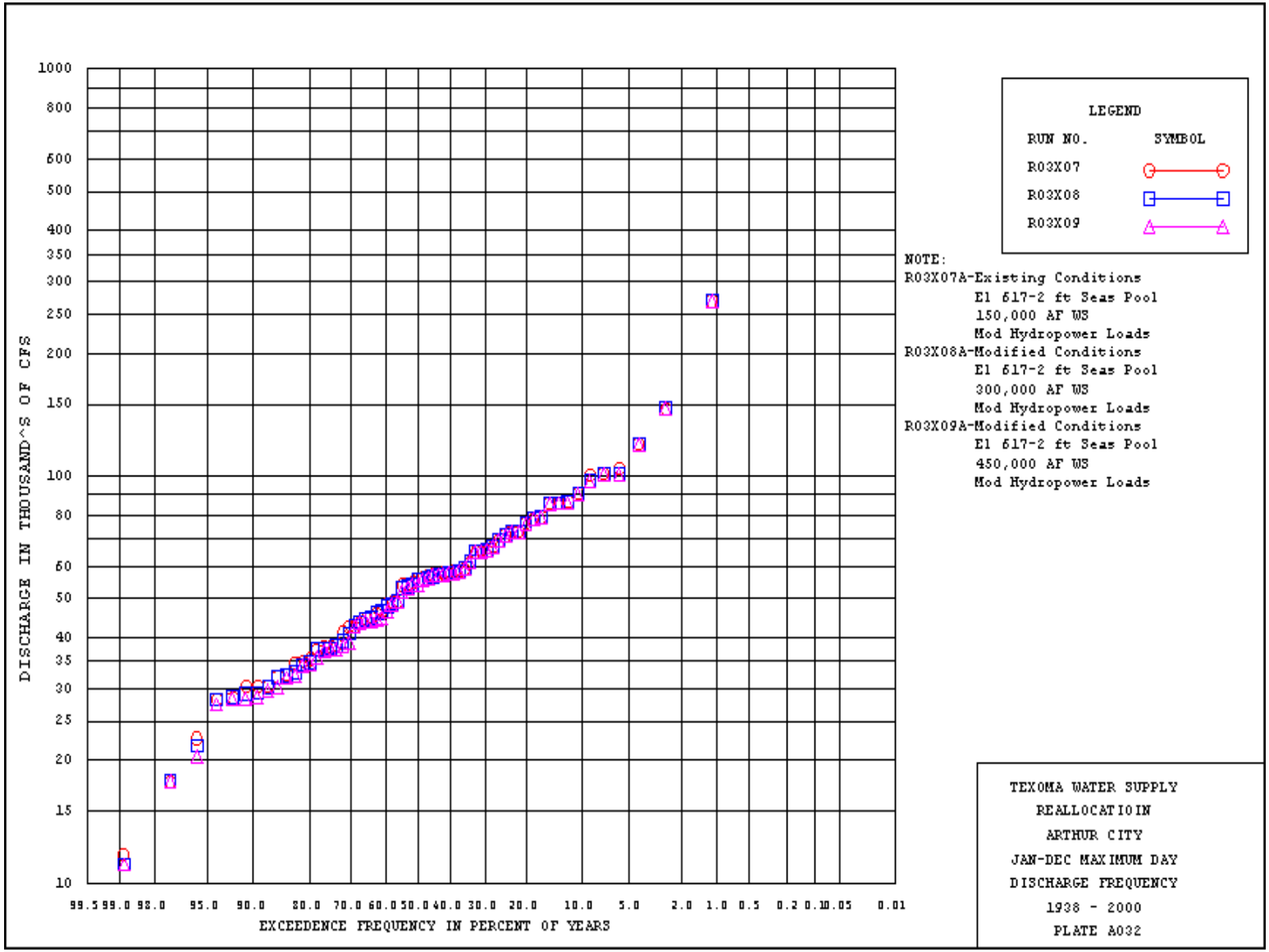

DISCHARGE IN THOUSAND^S OF CFS
1000
800
600
500
400
350
300
250
200
150
100
80
60
50
40
35
30
25
20
15
10
99.5 99.0 98.0 95.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 5.0 2.0 1.0 0.5 0.2 0.1 0.05 0.01
EXCEEDENCE FREQUENCY IN PERCENT OF YEARS
LEGEND
RUN NO. SYMBOL
R03X07
R03X08
R03X09
NOTE:
R03X07A-Existing Conditions
El 617-2 ft Seas Pool
150,000 AF WS
Mod Hydropower Loads
R03X08A-Modified Conditions
El 617-2 ft Seas Pool
300,000 AF WS
Mod Hydropower Loads
R03X09A-Modified Conditions
El 617-2 ft Seas Pool
450,000 AF WS
Mod Hydropower Loads
TEXOMA WATER SUPPLY
REALLOCATION IN
ARTHUR CITY
JAN-DEC MAXIMUM DAY
DISCHARGE FREQUENCY
1938 - 2000
PLATE A032

FIGURE 7

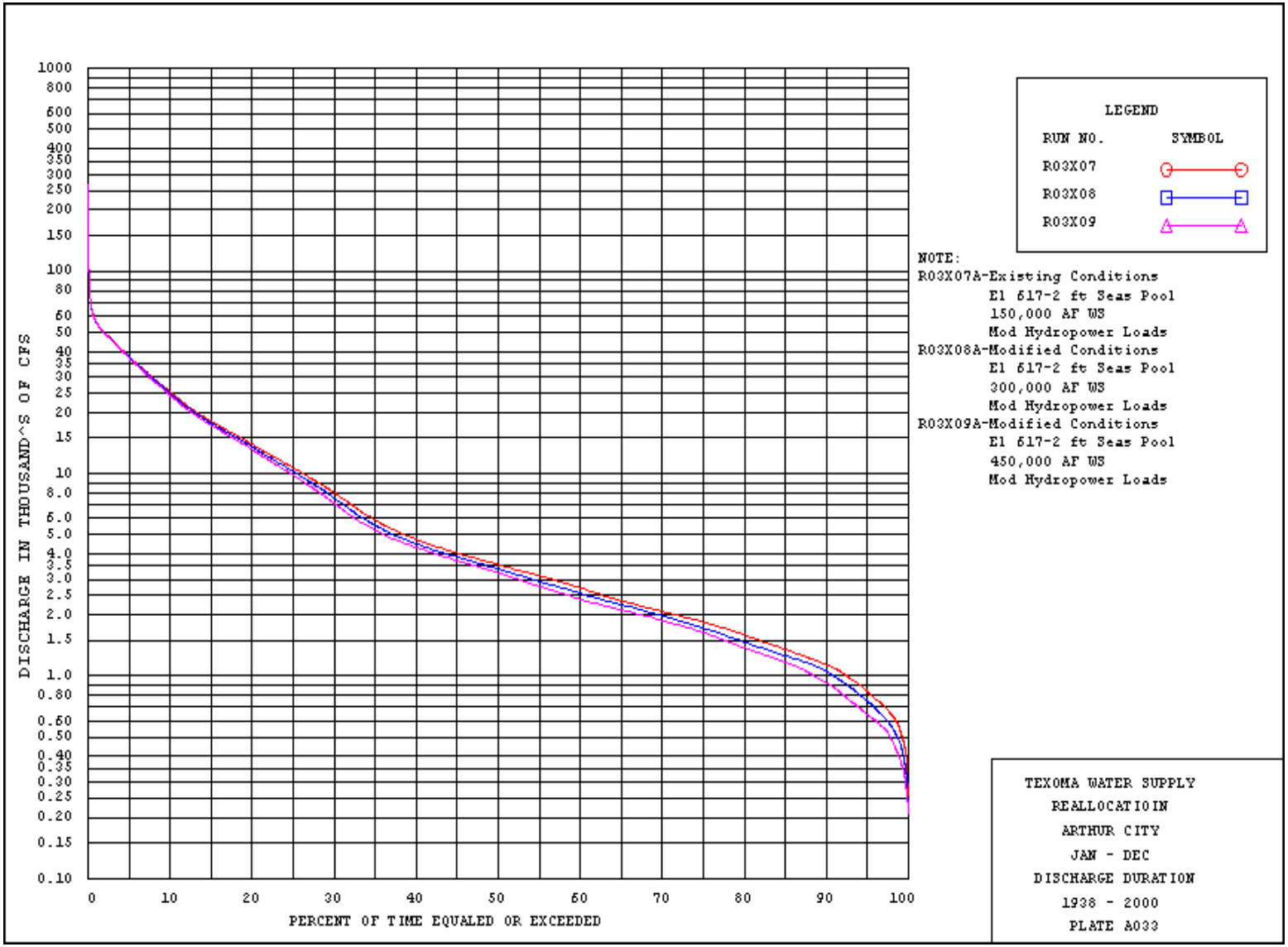

DISCHARGE IN THOUSAND^S OF CFS
1000
800
600
500
400
350
300
250
200
150
100
80
60
50
40
35
30
25
20
15
10
8.0
6.0
5.0
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.80
0.60
0.50
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0
10
20
30
40
50
60
70
80
90
100
PERCENT OF TIME EQUALED OR EXCEEDED
LEGEND
RUN NO.
SYMBOL
R03X07
R03X08
R03X09
NOTE:
R03X07A-Existing Conditions
El 617-2 ft Seas Pool
150,000 AF WS
Mod Hydropower Loads
R03X08A-Modified Conditions
El 617-2 ft Seas Pool
300,000 AF WS
Mod Hydropower Loads
R03X09A-Modified Conditions
El 617-2 ft Seas Pool
450,000 AF WS
Mod Hydropower Loads
TEXOMA WATER SUPPLY
REALLOCATIOIN
ARTHUR CITY
JAN - DEC
DISCHARGE DURATION
1938 - 2000
PLATE A033

FIGURE 8

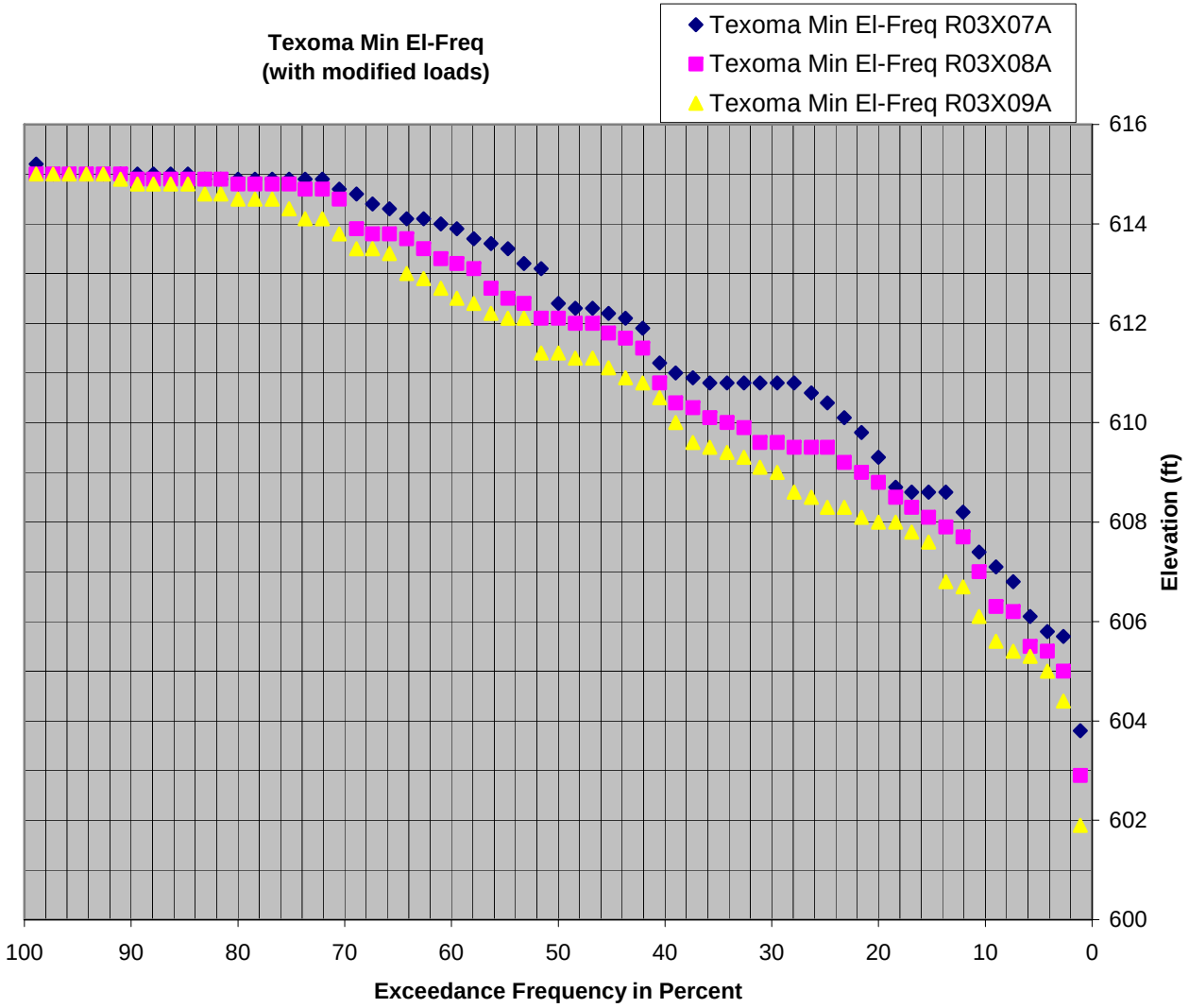
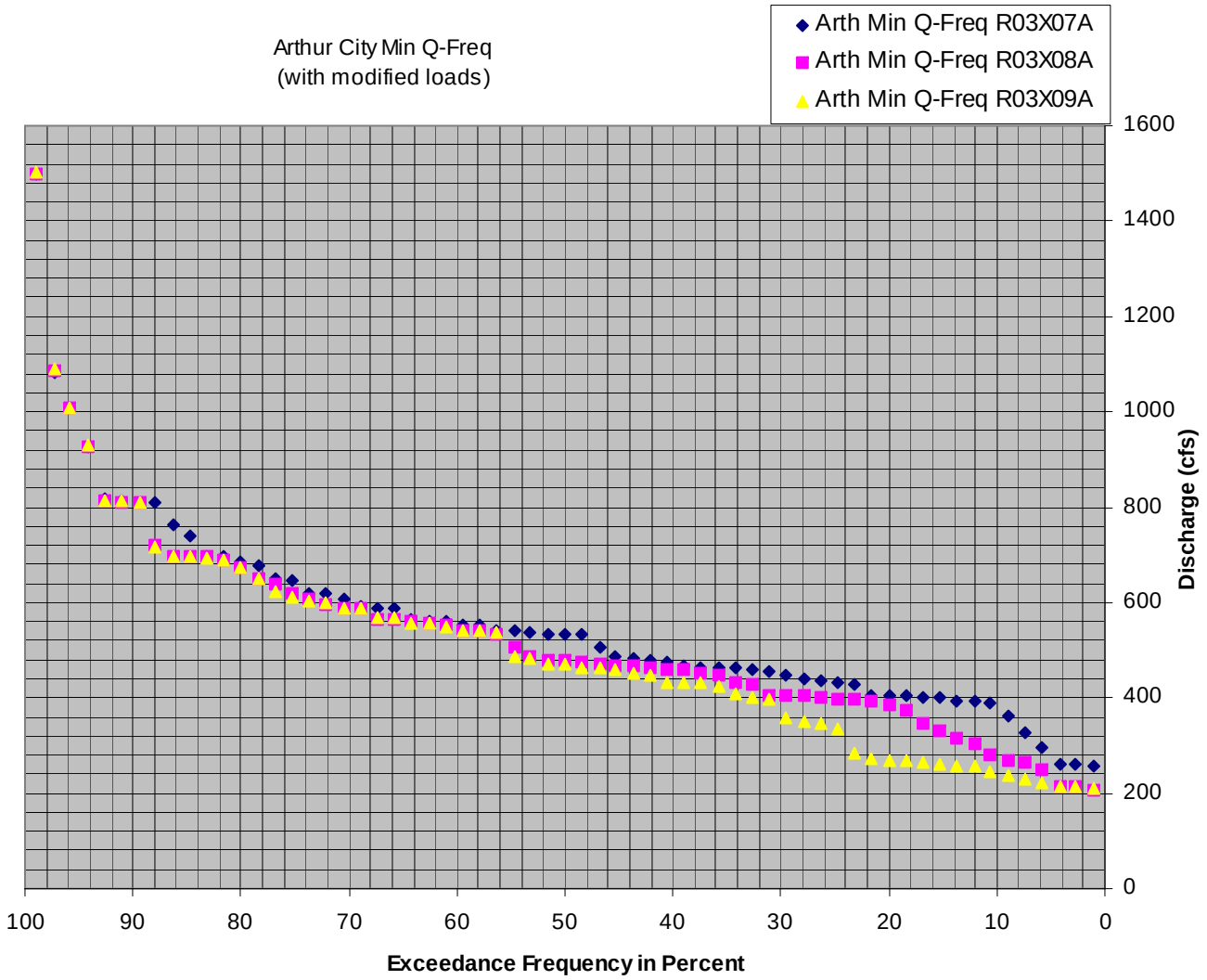

Texoma Min El-Freq
(with modified loads)
Texoma Min El-Freq R03X07A
Texoma Min El-Freq R03X08A
Texoma Min El-Freq R03X09A
616
614
612
610
608
606
604
602
600
Elevation (ft)
100
90
80
70
60
50
40
30
20
10
0
Exceedance Frequency in Percent

FIGURE 9


Arthur City Min Q-Freq
(with modified loads)
Arth Min Q-Freq R03X07A
Arth Min Q-Freq R03X08A
Arth Min Q-Freq R03X09A
1600
1400
1200
1000
800
600
400
200
0
Discharge (cfs)
100
90
80
70
60
50
40
30
20
10
0
Exceedance Frequency in Percent

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APPENDIX C

U.S. FISH AND WILDLIFE SERVICE CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
222 S. Houston, Suite A
Tulsa, Oklahoma 74127

In Reply Refer To:
FWS/R2/OKES/texomareallocationletter

October 5, 2004

Colonel Miroslav P. Kurka, District Engineer
Attn: Planning, Environmental, and Regulatory Division
U.S. Army Corps of Engineers
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Dear Colonel Kurka:

The U.S. Fish and Wildlife Service (Service) has reviewed a U.S. Army Corps of Engineers' (Corps) proposal to study the reallocation of water storage at Lake Texoma to increase the water supply storage, primarily for municipal use. The proposed study was included in your biological assessment dated November 20, 2003, and was considered part of the Corps' proposed action in the draft biological opinion for your actions on the Arkansas, Canadian, and Red Rivers. The list of species protected by the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*) provided for that formal consultation is still accurate and compliance with Section 7 of the ESA has been addressed in the draft biological opinion.

Assuming water demands for municipal use stay near current levels and Lake Texoma water levels will not be affected; we do not anticipate any federally-listed species to be adversely affected by the proposed reallocation of water storage. However, if demand for municipal water from Lake Texoma increases, we see potential for impacts to recreational use and fish and wildlife resources in the area near the reservoir and the Red River downstream. Municipal use usually has a very high priority relative to other uses and high demands during periods of low inflows could result in lower water levels and compromises for other uses. Management of national wildlife refuges, state wildlife management areas, and mitigation provided in compliance with the Fish and Wildlife Coordination Act and National Environmental Policy Act could be affected. If municipal water use is expected to increase, we recommend that the Corps address these potential impacts before approving any reallocations that may affect reservoir water levels. Consultation should be initiated with us and the state natural resource agencies to avoid any impacts to fish and wildlife resources.

Thank you for providing the opportunity to comment on the proposed study. Please coordinate any comments or information with Mr. Kevin Stubbs at 918-581-7458 ext 236.

Sincerely,

Jerry Brabander
Field Supervisor

cc: ARD-ES, Attn: Dean Watkins, U.S. Fish and Wildlife Service, Albuquerque, NM
Director, ODWC, Attn: Natural Resources Division, Oklahoma City, OK
Director, Texas Parks & Wildlife Dept., Austin, TX

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APPENDIX D

CULTURAL RESOURCES COORDINATION

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Dr. Bob Blackburn
State Historic Preservation Officer
Oklahoma Historical Society
2704 Villa Prom, Shepherd Mall
Oklahoma City, OK 73107

Dear Dr. Blackburn:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

Because the proposed water reallocation will not result in any changes in the existing lake level of Lake Texoma, we feel that the proposed reallocation of 300,000 acre-feet of existing hydropower storage to water supply will have "no effect" on cultural resources at Lake Texoma. We request your comment on our opinion of effect regarding this project.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Oklahoma Historical Society *Founded May 27, 1893*

State Historic Preservation Office • 2704 Villa Prom • Shepherd Mall • Oklahoma City, OK 73107-2441
Telephone 405/521-6249 • Fax 405/947-2918

March 6, 2001

Mr. David Combs, Chief
Environmental Analysis & Compliance
Tulsa District Corps of Engineers
1645 South 101st East Avenue
Tulsa, OK 74128-4609

RE: File #1068-01; Lake Texoma Reallocation of Water from Hydropower Storage Project

Dear Mr. Combs:

The referenced project does not include construction or earth-moving activities. Comments or opinions by this office are inappropriate for this project.

Should further projects include construction or earth-moving activities, an opinion should be requested from this office.

Further correspondence pertaining to this project must reference the above underlined file number. Thank you.

Sincerely,

Melvena Heisch

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:pm

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Dr. Robert Brooks
State Archeologist
Oklahoma Archeological Survey
111 East Chesapeake
Norman, OK 73019

Dear Dr. Brooks:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

Because the proposed water reallocation will not result in any changes in the existing lake level of Lake Texoma, we feel that the proposed reallocation of 300,000 acre-feet of existing hydropower storage to water supply will have "no effect" on cultural resources at Lake Texoma. We request your comment on our opinion of effect regarding this project.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Oklahoma Archeological Survey
THE UNIVERSITY OF OKLAHOMA

February 28, 2001

David L. Combs
Department of Army
Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, OK 74128-4609

RE: USACE proposed reallocation of 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply. Legal Dscription: Parts of T7S R5E and R6E, Love, Marshal, and Bryan Counties, Oklahoma.

Dear Mr. Combs:

Our office has no objections to the referenced project provided no ground disturbance will occur. The nature of the project is such that it should have no impact on the prehistoric cultural or archaeological resources of Oklahoma. We will defer to the State Historic Preservation Officer's opinion regarding impacts to historic structures. This review is conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society.

Sincerely,

Vicki L. Wedel
Staff Archeologist

Robert L. Brooks
State Archeologist

:vlw

cc: SHPO
Louis Vogele

111 E. Chesapeake, Room 102, Norman, Oklahoma 73019-5111 PHONE: (405) 325-7211 FAX: (405) 325-7604
A UNIT OF ARTS AND SCIENCES SERVING THE PEOPLE OF OKLAHOMA

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. F. Lawrence Oaks
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

Dear Mr. Oaks:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

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Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

RECEIVED
FEB 23 2001
TEXAS HISTORICAL COMMISSION

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. F. Lawrence Oaks
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

NO EFFECT
On National Register eligible/listed properties
or State Archeological Landmarks
PROJECT MAY PROCEED
by _____
for F. Lawerence
State Historic Preservation Officer
Date 3/2/01

Dear Mr. Oaks:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

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Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

NO EFFECT
On National Register eligible/listed properties
or State Archeological Landmarks
PROJECT MAY PROCEED
by _____
for F. Lawerence
State Historic Preservation Officer
Date _____

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Ms. Stacy Halfmoon
Caddo Indian Tribe of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Ms. Halfmoon:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

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Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Chickasaw Nation of Oklahoma
P.O. Box 1548
Ada, OK 74821

Dear Sirs:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

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Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Choctaw Nation of Oklahoma
P.O. Drawer 1210
Durant, OK 74720

Dear Sirs:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

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Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

FEB 15 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Gary McAdams
Wichita and Affiliated Tribes of Oklahoma
P.O. Box 729
Anadarko, OK 73005

Dear Mr. McAdams:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding a proposal to reallocate 300,000 acre-feet of water at Lake Texoma from existing hydropower storage to water supply for portions of northern Texas.

The enactment of Texas Senate Bill 1 in 1997 required that each area of Texas outline its future water needs for the 2000-2050 time period and to become less dependent upon groundwater resources. As a result of this requirement, the U.S. Army Corps of Engineers has received a request to consider the reallocation of 300,000 acre-feet of existing hydropower storage to use as water supply. If approved, the reallocation would not involve raising the existing lake level of Lake Texoma, but would simply reallocate storage space in the conservation pool of the lake from one purpose to another.

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Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

APPENDIX E

SECTION 404 PERMIT CORRESPONDENCE

CESWT-PE-E September 16, 2004

MEMORANDUM FOR CESWT-PE-E, ATTN: Mr. Jerry Sturdy

SUBJECT; Lake Texoma Reallocation Study, Project No. 14057

1. A review has been conducted for the Lake Texoma reallocation of 300,000 acre-feet of hydropower storage to water supply. The information provided does not indicate that a placement of dredged or fill material will be required, permanently or temporarily, into any "waters of the United States," including jurisdictional wetlands. Therefore, this proposal is not subject to regulation pursuant to Section 404 of the Clean Water Act, and a Department of the Army (DA) permit will not be required.

2. Although DA authorization is not required, this does not preclude the possibility that other Federal, State, or local permits may be required.

3. This project has been assigned Identification Number 14057. Please refer to this number during future correspondence. If further assistance is required, contact Mr. Jeff Knack at 918-669-4904.

Jeff Knack for
David A. Manning
Chief, Regulatory Branch

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APPENDIX F

PUBLIC NOTICE, COMMENTS, AND AGENCY RESPONSES